Section II

Developing Standardized Quality Indicators for EMS System Evaluation and Improvement.

A Model for EMS Indicator Development

Developing Standardized Quality Indicators for EMS System Evaluation and Improvement.

What is a Quality Indicator?

Quality indicators are measures of how well we are meeting the acceptable standard in the level of service we provide to our customers (patients). In other words, an EMS indicator measures the degree of conformance to an reasonable expectation as defined by the community they serve. Indicators may be structures (people, places, things), processes (activities occurring in a system), and outcomes (the results of the stuctures and activities within a system). In fact, the three types of indicators (structure, process and outcome) are all related and dependent upon one another. Hence the equation;

STRUCTURE + PROCESS = OUTCOME

Changes in structure may effect the process and the outcome. Likewise, changes in the process may effect the structure and outcome. This interdependence is best illustrated below;

More defibrillators per patients (Structure) + less time to defibrillation (Process) = higher cardiac arrest save rate (Outcome)

Indicators in short, are a way to simplify information so that data can be digested more efficiently and in a meaningful way.

Development of Standardized EMS Quality Indicators

Mountain-Valley EMS and the Center for Child Health Outcomes facilitated the process of developing standardized indicators. The project consortium chose nine indicators and reached consensus on the definitions, inclusion criteria, data numerators & denominators, and reporting format. A copy of the standardized indicator format and indicators that were developed are illustrated in section III of this document.

THE PROCESS

The primary tool used during this project for statewide EMS system evaluation was the standardized EMS quality indicators. Methods for developing and using the quality indicators to measure EMS system performance are described in the following steps;

STEP 1**. Asking the Questions**

- Gather all stakeholders together and begin by brainstorming questions about the system which the group would most likely want answered. Clearly state the purpose of the brainstorming session. Take a turn, in sequence, around the entire group. Do not criticize or discuss any ideas. Record each question carefully. This step can also be facilitated by distributing a survey.

- Clarify the brainstorming questions and make sure everyone understands all the items. Catagorize the questions based upon related subject matter and/or discipline

- Prioritize or rank the questions based upon the level of importance to stakeholders or customers. (this may be done by utilizing the "multivoting" QI technique)

- If possible, narrow the list of questions by eliminating any duplication or questions which may be too complex or off limits ie; finances, working conditions, etc.

Below is an example of typical EMS system questions generated by stakeholders.

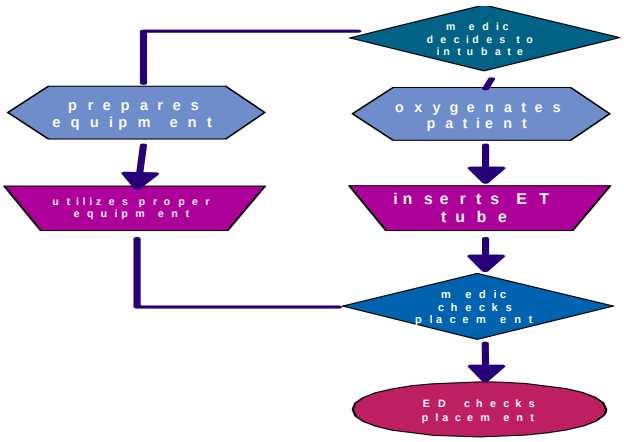
- *How many undetected esophageal intubations occur in our system per year? Per patient case load? Per endotracheal intubation attempt?*

-*How well do we measure up to the national cardiac arrest survival rates? Statewide? County wide?*

STEP 2**. Defining the Answer**

- Begin by clearly stating the question to be answered. Stratify the question (break down) into steps identifying the structures (who, what, where) and the activities (how) which lead to the outcome which will be measured.
  Note: stratification may lead to several smaller measurements; ie structures and processes which effect the outcome indicator which answers the questions more fully. The smaller indicators may be relevent and should be developed individually, but meanwhile keep focused on the big picture (question to be answered).

- Further stratification can be accomplished by utilizing a process flow chart to identify how, when or where an existing structure or process occurs. Below is an example of a flowchart.



- Undetected Esophageal Intubations

STEP 3. Building the Indicator

- Utilizing the standardized draft indicator form which is attached to the end of this section, begin by reaching consensus on the definition, reporting format, analysis, benchmarks references and classification of the indicator.

  DEFINITION: This can be done by building on Steps 1 & 2 of this process. If questions have been generated and answers narrowed down to a few structures, processes or outcomes, take each one, develop and present the words which best describe the indicator to be measured.

  Present the definition to the entire group and reach consensus on their meaning. modify the definition as needed. Record the specific words under the definition section of your draft indicator form. Below is an example of a indicator definition

.	**PERIPHERAL INTRAVENOUS (IV) SKILL SUCCESS RATE - ADULT**
DEFINITIONS	
success rate:	percentage (%) of successful placement of peripheral intravenous access device by EMS personnel per each patient case
patient case:	an individual patient which EMS personnel have performed one or more attempts to puncture of the skin with a needle catheter device with intent to gain access to peripheral venous circulation
success:	access to peripheral venous circulation as evidenced by ability to infuse intravenous fluids.
adult:	patients who have reached the age of 15 years or more

REPORTING FORMAT

Development of the reporting format requires that a minimum of six attributes be identified so that the data can be isolated and the reportobtained. Those attributes are

Inclusion criteria:	the specific population to be studied.
Numerator:	the part of the whole being evaluated
Denominator:	the whole being evaluated
Sample size:	the minimum number of data points required

reporting period:	the time from begining to end which the data was represents.
data source:	the original source of the data

The following is an example of a reporting format;

format:	% success rate per patient case (aggregate summary)
reporting formula -	total number successes divided by total number patient cases x 100 = %
data points-	inclusion criteria: all patients age 15 yrs or older treated by EMS personnel
	numerator: total number of patients cases where peripheral IV was successful
	denominator: total number of patients cases
	minimum sample size n = 30
reporting period	minimum 12 consecutive months
data source-	patient care documents (completed by EMS personnel)

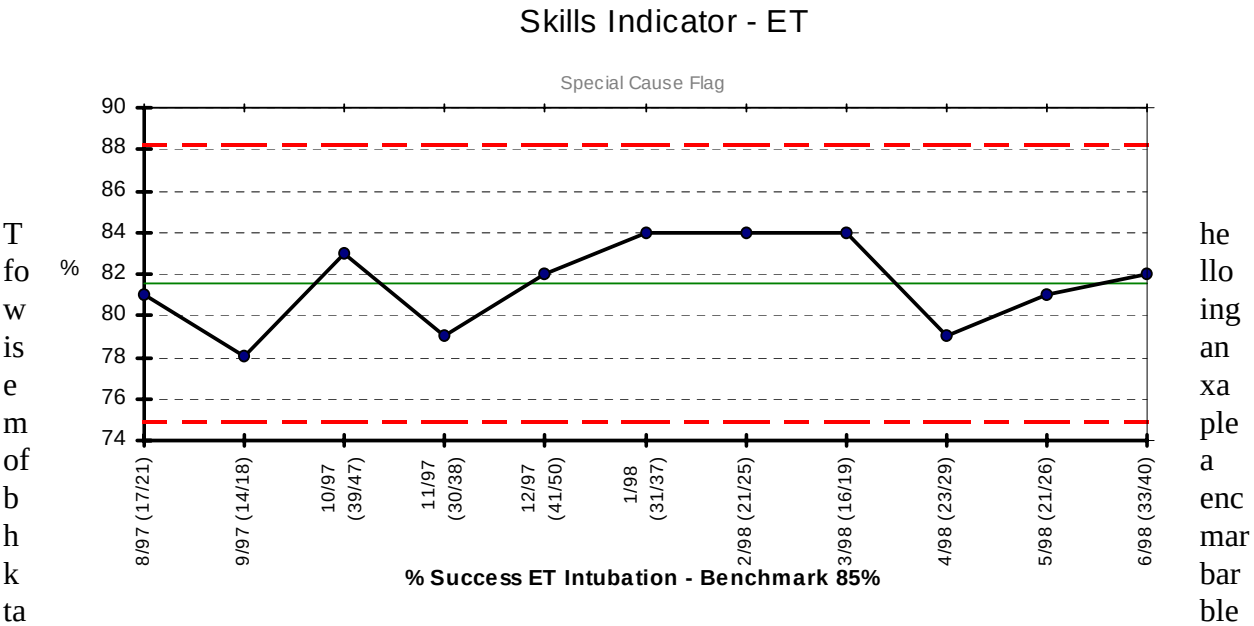
the following is an example of the reporting format

REPORTING	
format:	% success rate per patient case (aggregate summary)
reporting formula:	total number successes divided by total number patient cases x 100 = %
data points:	
inclusion criteria:	all patients age 15 yrs or older treated by EMS personnel
numerator:	total number of patients cases where peripheral IV was successful
denominator:	total number of patients cases
minimum sample size:	n = 30
reporting period:	minimum 12 consecutive months
data source:	patient care documents (completed by EMS personnel)

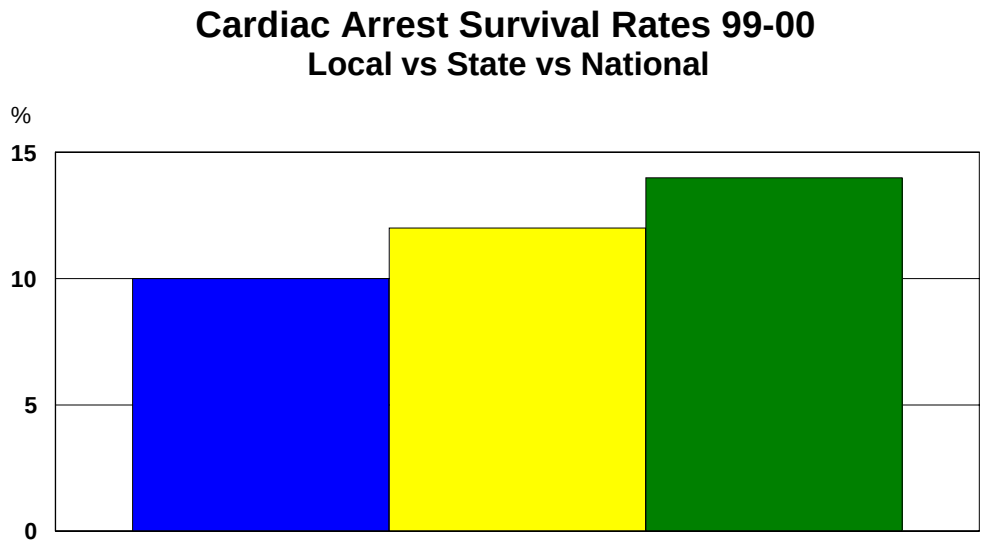
ANALYSIS

This section can be completed by identifying how the indicator will be presented to the group for evaluation. The two most common are; 1) to use a process control chart to look at variation if the indicator is an activity, or 2) to use a bar chart or graph to compare results with a benchmark if the indicator is a structure or outcome.

The following are examples of a process control chart and a bar graph;



The following is an example of a benchmarkable data



BENCHMAR K REFERENCES

This section should include a bibliography of articles or documented studies that include similar subject matter or examples of benchmarks or best practices. These references are used as a baseline for the group to determine the thresholds of each indicator.

The following is an example of benchmark references for the indicator ET success rates;

BENCHMARK REFERENCES

1 **88% success rate** – (Newark, NJ. high/volume inner city)
Krisanda, Thomas J, M.D., An Analysis of Invasive Airway Management in Suburban EMS System. Prehospital & Disaster Medicine; 1992 April-June, Vol 7, No 2, pages 121-123.

2 **86% success rate** – (Delaware, frequency vs Success)
O'Connor Robert, M.D. ET field experience: paramedics to proficiency, Prehospital & Disaster Medicine: 1995; Vol 10, No 4 (sup) S23.

3 **83% success rate** – (Tacoma, Wash. ET in out of hospital cardiac arrest)
Shirk, Tracey M.D., Comparison of ETC in out of hospital cardiac arrest; Prehospital & Disaster Medicine; 1995; Vol 10, No 4 (sup) S033.

4 **86% success rate** – (Paramedics: ET during CPR)
Smale JR., Endotracheal intibation by paramedics during in-hospital CPR; Chest: June 1995; Vol 7, pages 1661-1665

5 **86% success rate** – (ET with manikins and human subjects)
Stratton, SJ, M.D., Prospective study of manniquins and human subjects for endotracheal intubation training for paramedics. Ann of Emerg Med; 1991, Vol 20, Pages 1314-1318

Step 4. Approval of Indicator

- Once completed, the indicator should be reviewed for grammar, spelling and accuracy in determining the final mathematical product or indicator point. The draft indicator should then be presented back to the original stakeholders for final review and approval.

Step 5. Matching up the data

- The final indicator should then be given to data system specialist to determine the specifications and designs necessary to obtain the data points. (numerator, denominator, etc). Once this is completed, the indicator may now be tested by the group.

Step 6. Beta Testing the Indicator

- Testing the indicator requires that the participants who will be collecting the information receive training on what exactly they will be collecting and reviewing. Clearly state the purpose of the indicator (question to be answered) and what/how the data will be collected. Developing and distributing indicator summary report forms may be helpful at this phase. The following is an example of a indicator summary report.

  Clinical Skills
  % success rate for advanced airway
  % success rate for med administration
  % success rate for vascular access
  % success rate for cardiac skills

  Treatment Guideline Compliance
  % compliance cardiac
  % compliance respiratory
  % compliance trauma
  % compliance pediatric

  Non-Transport Disposition
  % refusal rate
  % refusal AMA rate

  ED/Hospital Survival
  % survival cardiac arrest -witnessed
  % survival cardiac arrest -unwitnessed
  % survival critical trauma-adult
  % survival pediatric poisonings
  % admission/survival pediatric resp distress

Each indicator summary item must have a full indicator sheet for reference.

Step 7. Evaluating the Beta Test

- Once the indicator has been tested, the group should decide the following;

    Were all the data points avaliable?

    Can the data be trusted? is it accurate? meaningful?

If no, then a barrier-aids analysis should be done to determine the corrective measures. once retested, the indicator can then be implemnented.

If yes, then the indicator can now be implemented.

Step 8. Implementation of Indicator

- If the indicator has been tested and approved by the group, then it should be finalized, published, classified for reference, and implemented.

Attached is a indicator format sheet and glossary for reference

ORAL ENDOTRACHEAL INTUBATION SUCCESS RATE - PEDIATRIC

DEFINITIONS

success rate: aggregate percentage (%) of successful placements of oral endotracheal tubes by paramedics per each patient attempt.

attempt: insertion of a laryngoscope blade beyond the teeth with the intent of placing an endotracheal tube in a individual patient.

success: correct oral placement of a endotracheal tube within a patient as indicated by the presence of (+) bilateral lung sounds and (-) gastric sounds through auscultation or other acceptable adjuncts/tests

pediatric: patients less than ten (10) years of age*

REPORTING: aggregate - % success rate per (period of time)

inclusion criteria: patients less than ten (10) years of age

Data points

denominator: total attempts oral endotracheal intubations

numerator: total successful oral endotracheal intubations

Formula: total success divided by total attempt x 100 = %

Data Source- Patient Care Documents (document by EMS personnel)

REPORTING EXAMPLE

reporting period:	**Jan to Mar 1999**
numerator =	**Total number successful ped ET = 50**
denominator =	**total number of ped Ets attempts = 100**
formula =	**numerator/denominator = 50/100 x 100 = 50%**
summary indicator reported item =	**50% pediatric patient ET success rate**

ANALYSIS: Process Variation - Special Causation
Benchmark Comparison - Best Practices

STATE BENCHMARK: TBD by baseline data collection

BENCHMARK REFERENCES

1. 91.6% Success Rate
Los Angeles County EMS Agency; Pediatric Airway Management Study. 1997

*** Anatomical Differences between Children and Adults; definition as reported by AHA; Advanced Cardiac Life Support Texbook. AHA pg 1-61. 1994**.

TREATMENT GUIDELINE-PROTOCOL COMPLIANCE RATE
TREATMENT POINT COMPLIANCE (TPC) RATE
CORONARY ISCHEMIC CHEST PAIN

DEFINITIONS

Compliance: Prehospital treatment to include modalities, procedures, dosages, and routes provided to the appropriate patient, WITHIN the indicated range of adult ALS treatment guideline-protocol: as published in the most recent version of local EMS agency ALS treatment guidelines.

CORONARY ISCHEMIC CHEST PAIN TREATMENT COMPLIANCE CRITERIA

1. Oxygen administration 2). EKG monitor, 3). Peripheral IV access, 4). Administration of aspirin, 5). Administration of nitroglycerine, 6. Administration of morphine sulfate

Compliance Rate: total % compliance per total cases
Point Rate: Total % patients receiving each

REPORTING:

Aggregate - % compliance rate per total cases (period of time)
% compliance rate per each TCP (period of time)
Formula - total compliance divided by total cases x 100 = %
Data points-
Inclusion: all pts coded with coronary ischemic chest pain
pts who received all of above (1-6) treatments
pts who receive one of above (1-6)
Data Source: patient Care Documents (document by EMS personnel)

REPORTING EXAMPLE

reporting period:	**Jan to Mar 1999**
numerator =	**Total pts meeting LEMSA criteria = 58**
denominator =	**total number of pts meeting LEMSA Tx criteria (N= 67)**
formula =	**numerator/denominator = 58/67 x 100 = 86.5%**
summary indicator reported item =	**86% of all patients meeting treatment criteria received full compliance with treatment guideline.**

ANALYSIS:

process Variation - Special Causation
Benchmark Comparison - Best Practices
Expected vs Actual Treatment

BENCHMARK REFERENCES

1. 98% Compliance – UCLA; EMT-P deviations from protocols
Hoffman JR: Does paramedic base hospital contact result in beneficial deviations from protocols?, West J Med 153: P 283-287, 1990
2. 97% Compliance – Univ of Michigan; EMT-P, QA Audit
Swor, RA: A paramedic peer review quality assurance audit, Pre Hospital & Disaster Medicine 6:3 321-326, 1991
3. 98% Compliance – Univ of Michigan, EMT-P, computer assisted QA
Swor, RA: A computer assisted quality assurance audit in a multi-provider EMS system, Ann of Emerg Med 19:286-290, 1990
4. 97% compliance – Drew Medical, LA. Deviations from protocol
Wasserberger J, MD. Base station prehospital care: judgment errors and deviations from protocol. Ann of Emerg Med 16:8, 867-869, 1987

CRITICAL TRAUMA SURVIVAL RATE- ADULT HOSPITAL ADMISSION

DEFINITIONS

Patient: patients who access an organized EMS system
Critical
Trauma: patients over age 12 or 40 kg who have sustained one or more mechanisms of injury and any of the following physiological criteria:

Glasgow Coma Scale less than 13
Systolic Blood Pressure less than 90 mm hg
Resp rate less than 10 or greater than 26/min

Survival: admission to hospital alive
Survival rate: the number of patients admitted to hospital alive divided by the number of patients identified as critical trauma.

REPORTING:

Aggregate - % survival to admission alive rate per total cases
Formula - total survival to admission divided by total cases x 100 = %
Data points-
inclusion: all pts coded with mech of inj & GCS < 13, BP<90 or Resp rate <10 or >13-pts admitted to hospital
numerator: number survive to admission
denominator: number of total cases meeting criteria
Data Source- Patient Care Documents (document by EMS personnel)
Hospital admission records

REPORTING EXAMPLE

reporting period: **Month of 7/99**
numerator = **total number of patients admitted to hospital (N= 7)**
denominator = **total number of patients meeting criteria (N=44)**
formula = **numerator/denominator x 100 = % (7/44) x 100 =15 %**
summary indicator reported item = **15% survival to admission (Critical Trauma - Adult)**

ANALYSIS:

Benchmark Comparison - Best Practices

BENCHMARK REFERENCES

1. **To Be Determined by baseline data.**
2. **28.6% Survival** – Critical Trauma – Calgary Trauma Registry
Plant J. Limitations of Prehospital Index in identifying Patients in need of a Major Trauma Center., Ann of Emerg Med; 26:2, 133-137. 1995
3. **29% Survival** – Critical Trauma, Alpine Motherlode San Joaquin Trauma Registry
Alpine, Motherlode, San Joaquin EMS Trauma Registry. 1987

EMERGENCY MEDICAL DISPATCH
CASE REVIEW COMPLIANCE

DEFINITIONS:

Case Review
Compliance: Peer or Medical Director review of case where the EMD dispatcher provided service to the caller by obtaining appropriate information, determining need, and providing pre-arrival instructions and dispatch of emergency resources. Each case will follow the total case rating % compliance score system as determined by the Dispatch Case Review Template. The following are case review points;

1. Basic questions obtained
2. Key questions asked
3. Case entry information asked
4. Emotional content cooperation score
5. Post dispatch and pre-arrival instructions

REPORTING:

Aggregate - % total overall compliance with all case review points
Data points
numerator: number total compliance with all case review points
denominator: total cases reviewed
formula - number of compliance with each case review point
divided by total case review point x 100 = %
Data Source- Dispatch Agency Medical Control/Peer Review Template, Human review - reported compliance Yes/No

REPORTING EXAMPLE

reporting period:	**Jan to Mar 1999**
numerator =	**Total cases compliant with all case points (N=58)**
denominator =	**total number of cases reviewed (N= 67)**
formula =	**numerator/denominator = 58/67 x 100 = 86.5%**
summary indicator reported item =	**86% of all EMD cases were compliant**

ANALYSIS:
Process - Variation (Special Causation)
Benchmark Comparison - Best Practices

BENCHMARK REFERENCES

1. To Be Determined by baseline data.

SCENE TIME
CORONARY ISCHEMIC CHEST PAIN - 10 Mins

DEFINITIONS

Compliance:	Scene time of 10 mins or less
Patients CICP:	All patients 15 yrs or older assessed by EMS personnel as having coronary ischemic chest pain (CICP)
Scene Time:	Wheel stop to wheel start-ALS responding/transporting unit

REPORTING:

Aggregate:-	% compliance rate per total cases (period of time)
	Compliance rate per each TCP (period of time)
Formula:	total cases10 mins or less divided by total cases x 100 = %
Data points	
Numerator:	cases 10 mins or less
Denominator:	all cases meeting criteria
Inclusion:	all pts coded with coronary ischemic chest pain
Data Source:	patient Care Documents (document by EMS personnel

REPORTING EXAMPLE

reporting period:	**Jan to Mar 1999**
numerator =	**Total cases under 10 mins = 58**
denominator =	**total cases meeting criteria (N= 67)**
formula =	**numerator/denominator = 58/67 x 100 = 86.5%**
summary indicator reported item =	**86% of all coronary ischemic chest pain patients Had scene times 10 mins or less**

ANALYSIS:
process Variation - Special Causation
Benchmark Comparison - Best Practices
Expected vs Actual Treatment

BENCHMARK REFERENCES

1. 98% Compliance – UCLA; EMT-P deviations from protocols
Hoffman JR: Does paramedic base hospital contact result in beneficial deviations from protocols?, West J Med 153: P 283-287, 1990

2. 97% Compliance – Univ of Michigan; EMT-P, QA Audit
Swor, RA: A paramedic peer review quality assurance audit, Pre Hospiatl & Disaster Medicine 6:3 321-326, 1991
3. 98% Compliance – Univ of Michigan, EMT-P, computer assisted QA
Swor, RA: A computer assisted quality assurance audit in a multi-provider EMS system, Ann of Emerg Med 19:286-290, 1990
4. 97% compliance – Drew Medical, LA. Deviations from protocol
Wasserberger J, MD. Base station prehospital care: judgment errors and deviations from protocol. Ann of Emerg Med 16:8, 867-869, 1987.

DESTINATION OF TRAUMA PATIENTS MEETING LEMSA TRAUMA CRITERIA

DEFINITIONS

Destination: The receiving facility where patient is transported
Trauma Patient: patients who access an organized EMS system.
Trauma Criteria: as defined by local EMS Agency
Trauma Center: as designated by local EMS Agency
Patient: all patients age 15 yrs or older

REPORTING:

Indicator item: % patients meeting trauma triage criteria who were transported to a designated trauma center or receiving facility.
reporting formula: total patients transported to trauma center divided by total number of trauma patients x 100 = %

data points:
inclusion criteria: all patients age 15 yrs or older
numerator: total number of patients meeting LEMSA trauma criteria and transported to trauma center.
denominator: total number of trauma patient meeting LEMSA trauma criteria.
minimum points: n = 30

reporting period monthly or annually (minimum 12 consecutive months)
data source: Patient care documents/trauma registry

REPORTING EXAMPLE

reporting period:	**Jan to Mar 1999**
numerator =	**Total pts meeting LEMSA criteria & transported to TC = 58**
denominator =	**total number of pts meeting LEMSA criteria (N= 67)**
formula =	**numerator/denominator = 58/67 x 100 = 86.5%**
summary indicator reported item =	**86% of patients meeting LEMSA trauma criteria were**

ANALYSIS

Central Tendency: Mean - Mode -Standard Deviation
Process: Variation - Special Causation
Outcome: Benchmark Comparison - Best Practices

BENCHMARK REFERENCES

TBD - baseline data collection

DESTINATION OF PEDIATRIC PATIENTS

DEFINITIONS

Destination: The receiving facility where patient is transported
Pediatric Patient: Patients who has not yet reached age 15 yrs.
Ped Triage Criteria: As defined by local EMS Agency
Ped Receiving Cen: As designated by local EMS Agency

REPORTING:

Indicator item: % patients meeting pediatric triage criteria who were transported to a designated pediatric receiving center.
reporting formula: total patients transported to pediatric receiving center divided by total number of pediatric patients x 100 = %

data points:
inclusion criteria: all patients age who have not reached age 15 yrs
numerator: total number of patients meeting LEMSA pediatric triage criteria and transported to designated pediatric receiving center.
denominator: total number of pediatric patients meeting LEMSA ped triage criteria.
minimum points: n = 30

reporting period monthly or annually (minimum 12 consecutive months)
data source: Patient care documents/trauma registry

REPORTING EXAMPLE

reporting period:	**Jan to Mar 1999**
numerator =	**Total pts meeting LEMSA ped criteria & transported to ped center = 58**
denominator =	**total number of pts meeting LEMSA ped criteria (N= 67)**
formula =	**numerator/denominator = 58/67 x 100 = 86.5%**
summary indicator reported item =	**86% of patients meeting LEMSA ped criteria were transported to designated ped center.**

ANALYSIS

Central Tendency: Mean - Mode -Standard Deviation
Process: Variation - Special Causation
Outcome: Benchmark Comparison - Best Practices

BENCHMARK REFERENCES

TBD - baseline data collection

Statewide EMS System Evaluation Project
SYSTEM PERFORMANCE INDICATOR

NON TRANSPORT DISPOSITION

DEFINITIONS:

Prehospital Patient: patients who access an organized EMS system

Refusal: EMS personnel/transporation are summoned to scene. patient contact intiated. Patient refuses transportation **with** agreement of on scene personneland/or medical control. Pt deceased. Pt transported by another ambulance

Refusal rate: the number of patients not transported to hospital divided by the total number of patient contacts.

REPORTING

Indicator item: % patient contacts not transported to hospital
reporting formula: number of patient refused/total patient contacts x 100 = %
data points
inclusion criteria: all patients in accessing an organized EMS system
numerator: total pt non-transports
denominator: total patient contacts
minimum data: n=30
data source: patient care documents, dispatch records

REPORTING EXAMPLE

Reporting period:	**month of 7/00**
Numerator:	**total non transports (n=25)**
Denominator:	**total patient contacts (n=100)**
Formula:	**numerator/denominator x 25/100 x 100 = %=25%**
Summary report item=	**25% of all pt contacts were not transported**

ANALYSIS

Process variation

BENCHMARK REFERENCES

1. TBD by baseline data
2. 38% refusal rate - UCSF
   Braun O, MD. Characteristics of a Midsized Urban EMS System
   Ann of Emerg Med; 19:536-546. 1990

Statewide EMS System Evaluation Project
SYSTEM PERFORMANCE INDICATOR

NON TRANSPORT DISPOSITION
PT REFUSAL - AGAINST MEDICAL ADVICE (AMA)

DEFINITIONS:

Prehospital Patient: patients who access an organized EMS system

Refusal AMA: EMS personnel/transportation are summoned to scene. patient contact intiated. Patient refuses treatment and/or transportation **without** agreement of on scene personnel and/or medical control.

AMA Refusal rate: the number of patients refusing treatment and/or transported to hospital divided by the total number of patient contacts.

REPORTING

Indicator item: % patient contacts where patient refuses AMA
reporting formula: number of patient refused AMA/total patient contacts x 100 = %
data points
inclusion criteria: all patients in accessing an organized EMS system
numerator: total pt refusal AMA
denominator: total patient contacts
minimum data: n=30
data source: patient care documents, dispatch records

REPORTING EXAMPLE

Reporting period: **month of 7/00**
Numerator: **total pt refusal AMA (n=25)**
Denominator: **total patient contacts (n=100)**
Formula: **numerator/denominator x 25/100 x 100 = %=25%**
Summary report item= **25% of all pt contacts were refusal AMA**

ANALYSIS

Process variation

BENCHMARK REFERENCES

1. TBD by baseline data
2. 38% refusal rate - UCSF
   Braun O, MD. Characteristics of a Midsized Urban EMS System
   Ann of Emerg Med; 19:536-546. 1990

Statewide EMS System Evaluation Project
SYSTEM PERFORMANCE INDICATOR

CRITICAL TRAUMA SURVIVAL - ADULT

DEFINITIONS;
Prehospital Patient: -patients who access an organized EMS system
Critical Trauma: -patients over age 12 or 40 kg who have sustained one or more mechanisms of injury and any of the following physiological criteria:

Glascow Coma Scale less than 13
Systolic Blood Pressure less than 90 mm hg
Resp rate less than 10 or greater than 26/min

Survival: -discharged from hospital alive
Survival rate: -the number of patients discharged alive from the hospital divided by the number of patients identified as critical trauma

REPORTING: Aggregate - % survival rate per annual total cases

BENCHMARK REFERENCES

1. **To Be Determined by baseline data.**
1. **28.6% Survival** – Critical Trauma – Calgary Trauma Registry
   Plant J. Limitations of Prehospital Index in identifying Ptients in need of a Major Trauma Center
   Ann of Emerg Med; 26:2, 133-137. 1995
2. **29% Survival** – Critical Trauma, Alpine Motherlode San Joaquin Trauma Registry
   Alpine, Motherlode, San Joaquin EMS Trauma Registry. 1987

California Statewide EMS System Evaluation Project
EMS SYSTEM PERFORMANCE INDICATOR

PREHOSPITAL DEFIBRILLATION
SURVIVAL TO HOSPITAL ADMISSION

DEFINITIONS

% survival	percentage (%) of patients defibrillated in cardiac arrest who survive to hospital admission.
Defibrillation:	delivery of trans-thoracic electrical current by EMS personnel
cardiac arrest :	patients with documented absence of pulse and respirations witnessed or unwitnessed - non traumatic etiology
hospital admission	patient accepted for admission or transferred for admission by an acute care facility from a emergency department or a approved receiving facility

REPORTING:

indicator item	% survival to admission rate per total cases (aggregate summary)
reporting formula	total survival to admission divided by total patients defibrillated x100 = %
data points:	
inclusion criteria:	all patients defibrillated by EMS personnel
numerator:	patients admitted to a hospital after pehospital defibrillation
denominator:	total number of patients who were defibrillated
minimum points:	N=30
reporting period:	monthly or annually (minimum of 12 consecutive months)
data source:	patient care documents (document by EMS personnel)
	hospital admission records

ANALYSIS:

Benchmark Comparison - Best Practices

BENCHMARK REFERENCES

1. Kass LE. One Year Survival after Prehospital Cardiac Arrest: The Utstein Model applied to Rural-Suburban EMS System. Ann of Emerg Med; 12:17-20, 1994
2. Wisconsin study
   Olson DW, MD. EMT-Defibrillation: The Wisconsin Experience.
   Ann of Emerg Med, 18:8;806. 1989
1. UCSFCalllahan M. Relationship of timliness of Paramedic ALS intervention to Outcome of Out of Hospital Cardiac Arrest. Ann of Emerg Med 27:637-648, 1996.
2. Albert Einstein College of Medicine, NY
   Gallagher M. Survival Variation in Cardiac Arrest ocurring after EMS Arrival.
   Albert Einstein College of Medicine, NY. 1995.

California Statewide EMS System Evaluation Project
EMS SYSTEM PERFORMANCE INDICATOR

PREHOSPITAL DEFIBRILLATION
RETURN OF SPONTANEOUS CIRCULATION (ROSC)

DEFINITIONS

Prehospital Patient:	patients who access an organized EMS system
Cardiac arrest:	documented absence of pulse and respirations
ROSC Survival:	return of a palpable pulse
Survival rate:	the number of patients who survive to ROSC after receiving One or more shocks by prehospital personnel

REPORTING Aggregate - % survival to ROSC rate per annual total cases

indicator item	% survival to ROSC (aggregate summary)
reporting formula	total survival to ROSC divided by total patients defibrillated x 100 = %
data points:	
inclusion criteria:	all patients defbrillated by by EMS personnel
numerator:	patients with documented ROSC after defibrillation
denominator:	total number of patients defibrillated
	minimum points: N=30
reporting period:	monthly or annually (minimum of 12 consecutive months)
data source:	patient care documents (document by EMS personnel)

REPORTING EXAMPLE

reporting period:	**Month of 7/99**
numerator =	**total number of patients with documented ROSC (N= 12)**
denominator =	**total number of patients defibrillatedt (N=44)**
formula =	**numerator/denominator x 100 = % (12/44) x 100 =27 %**
summary indicator reported item =	**27% ROSC post defib survival**

ANALYSIS:

Outcome:
Benchmark Comparison - Best Practices

BENCHMARK REFERENCES

TBD – To Be Determined by Base Line EMS data Collection

EMS SYSTEM PERFORMANCE INDICATOR

PREHOSPITAL DEFIBRILLATION
% DISCHARGED FROM HOSPITAL ALIVE

DEFINITIONS

% discharged	percentage (%) of patients defibrillated in cardiac arrest who survive to hospital discharge.
Defibrillation:	delivery of trans-thoracic electrical current by EMS personnel
cardiac arrest :	patients with documented absence of pulse and respirations witnessed or unwitnessed - non traumatic etiology
hospital discharge:	patient discharged from hospital alive

REPORTING:

indicator item	% discharged per total cases (aggregate summary)
reporting formula	total discharged divided by total patients defibrillated x 100 = %
data points:	
inclusion criteria:	all patients defibrillated by EMS personnel
numerator:	patients discharged alive from hospital after pehospital defibrillation
denominator:	total number of patients who were defibrillated
minimum points:	N=30
reporting period:	monthly or annually (minimum of 12 consecutive months)
data source:	hospital discharge records

REPORTING EXAMPLE

reporting period:	**Month of 7/99**
numerator =	**total number of patients discharged from hospital (N= 5)**
denominator =	**total number of patients defibrillated (N=44)**
formula =	**numerator/denominator x 100 = % (5/44) x 100 =11.3 %**

summary indicator reported item = 11.3% survival to discharge(Prehospital Defibrillation)

ANALYSIS:

Benchmark Comparison - Best Practices

BENCHMARK REFERENCES

1. **K**ass LE. One Year Survival after Prehospital Cardiac Arrest: The Utstein Model applied to Rural-Suburban EMS System. Ann of Emerg Med; 12:17-20, 1994
2. Olson DW, MD. EMT-Defibrillation: The Wisconsin Experience. Ann of Emerg Med, 18:8;806. 1989
1. Callahan M. Relationship of timliness of Paramedic ALS intervention to Outcome of Out of Hospital Cardiac Arrest. Ann of Emerg Med 27:637-648, 1996.
2. Albert Einstein College of Medicine, NY
   Gallagher M. Survival Variation in Cardiac Arrest ocurring after EMS Arrival.
   Albert Einstein College of Medicine, NY. 1995.

California Statewide EMS System Evaluation Project
EMS SYSTEM PERFORMANCE INDICATOR

PREHOSPITAL DEFIBRILLATION -ADULT
CALL EFFECT TIME INTERVAL - PSAP

DEFINITIONS

Call Effect: appropriate response to a request for emergency medical services is
Time Interval: the lapse of time a Public Safety Answering Point (PSAP) takes to effect a request for emergency medical.
Lapse of Time: the recorded interval in minutes and/or seconds between call received (pick up) by by Public Service Answering Point (PSAP) dispatcher to when the information is transmitted for response.
PSAP: Public Safety Answering Point or dispatch center where a public emergency medical services telephone number (911) is answered.
Patient: patients who access an organized EMS system.
Defibrillation: delivery of trans-thoracic electrical current by EMS personnel.

REPORTING:

Indicator item: Average/mean call effect time interval in mins/seconds per patient cases where defibrillation was performed. (aggregate summary)
report formula: total cumulative call effect time interval in seconds divided by total Patients where defibrillation was administered by prehospital personnel.
data points:
inclusion: all patients age 15 yrs or older where defibrillation was administered by prehospital personnel.
numerator: total number of seconds/mins for call effect times
denominator: total number of patients where defib administered
convert mins: not applicable
min points: n = 30
report period monthly or annually (minimum 12 consecutive months)
data source: Telephone line recorder, PSAP records/patient care documents

REPORTING EXAMPLE

reporting period:	**Jan to Mar 1999**
numerator =	**call effect time interval - cumulative seconds = 1500 s**
denominator =	**total number of patient defibrillated (N= 50)**
formula =	**numerator/denominator = 30s**

summary indicator reported item = 30 s average call effect time interval

ANALYSIS

Central Tendency: Mean - Mode -Standard Deviation
Process: Variation - Special Causation
Outcome: Benchmark Comparison - Best Practices

BENCHMARK REFERENCES

1 90% determine time interval - 30 seconds
Pointer.J,M.D. Evaluation of EMS Systems; ideal dispatch & field interval standards National Assn of EMS Physicians. Mosby-Year Book., 1993, pp. 36-48.

2 90% response interval – 30 seconds
Ryan, J. M.D., Prehospital Systems & Medical Oversight. National Association of EMS Physicians. Mosby, 1994. p 225.

California Statewide EMS System Evaluation Project
EMS SYSTEM PERFORMANCE INDICATOR

PREHOSPITAL DEFIBRILLATION -ADULT
CALL EFFECT TIME INTERVAL- SECONDARY DISPATCH CENTER

DEFINITIONS

Call Effect: appropriate response to a request for emergency medical services is
Time Interval: the lapse of time a Public Safety Answering Point (PSAP) takes to effect a request for emergency medical.
Lapse of Time: Lapse of Time: the recorded interval in minutes and/or seconds between call received (pick up) by a secondary dispatch center to when the information is transmitted for response.
Secondary Disp Center: a public or private dispatch center where a request for an emergency medical services response is accepted directly from a PSAP where a public emergency medical services telephone number (911) is answered.
Patient: patients who access an organized EMS system.
Defibrillation: delivery of trans-thoracic electrical current by EMS personnel

REPORTING:

Indicator item: Average/mean call effect time interval in mins/seconds per patient cases where defibrillation was performed. (aggregate summary)
report formula: total cumulative call effect times in seconds divided by total Patients where defibrillation was administered by prehospital personnel.

data points:

inclusion: all patients age 15 yrs or older where defibrillation was administered by prehospital personnel.
numerator: total number of sec/min for call effect times
denominator: total number of patients where defib administered
convert mins: not applicable
min points: n = 30
report period monthly or annually (minimum 12 consecutive months)
data source: Telephone line recorder, PSAP records/patient care documents

REPORTING EXAMPLE

reporting period:	**Jan to Mar 1999**
numerator =	**Call effect time interval- cumulative seconds = 100 s (2^{nd} dispatch center)**
denominator =	**total number of patient defibrillated (N= 50)**
formula =	**numerator/denominator = 20 s**

summary indicator reported item = 20 s average/mean call effect time - 2^{nd}

ANALYSIS

Central Tendency: Mean - Mode -Standard Deviation
Process: Variation - Special Causation
Outcome: Benchmark Comparison - Best Practices

BENCHMARK REFERENCES

1. 90% queue time interval - 0 seconds
Pointer.J,M.D. Evaluation of EMS Systems; ideal dispatch & field interval standards
National Assn of EMS Physicians. Mosby-Year Book., 1993, pp. 36-48.

California Statewide EMS System Evaluation Project
EMS SYSTEM PERFORMANCE INDICATOR

PREHOSPITAL DEFIBRILLATION
ROLL TIME

DEFINITIONS

Roll Time: the lapse of time a responding unit takes between the time of dispatch and the arrival on scene.
Lapse of time: the recorded interval in minutes and/or seconds between time of dispatch and reported arrival on scene of emergency.
Time of dispatch: the time when a responding unit is officially alerted of a request for response by a designated dispatching agency.
Arrival on scene: The time when the responding unit reports that they have reached the location as requested by dispatch agency.
Responding Unit: a public or private EMS response agency capable of providing defibrillation.
Patient: patients who access an organized EMS system.
Cardiac Arrest: documented absence of pulse and respirations
Defibrillation: delivery of trans-thoracic electrical current by EMS personnel

REPORTING:

Indicator item: Average/mean roll time in minutes/seconds per patient cases where defibrillation was performed. (aggregate summary)
reporting formula: total cumulative roll times in seconds divided by total patient cases where defibrillation was administered by prehospital personnel. convert to minutes: divide product by 60.

data points:

inclusion criteria: all patients age 15 yrs or older where defibrillation was administered by prehospital personnel.
numerator: total number of seconds for all roll times
denominator: total number of patient where defib administered
convert minutes: divide by 60
minimum points: n = 30
reporting period: monthly or annually (minimum 12 consecutive months)
data source: PSAP records/patient care documents

REPORTING EXAMPLE

reporting period:	**Jan to Mar 1999**
numerator =	**Roll time- cumulative seconds = 25000 s**
denominator =	**total number of patient defibrillated (N= 50)**
formula =	**numerator/denominator = 25000 s /50 = 500s/60 = 8.3 mins**
summary indicator reported item =	**8.3 mins = average/mean roll time**

ANALYSIS

Central Tendency: Mean - Mode -Standard Deviation
Process: Variation - Special Causation
Outcome: Benchmark Comparison - Best Practices

BENCHMARK REFERENCES

1 90% roll time interval - 5 mins
Pointer.J,M.D. Evaluation of EMS Systems; ideal dispatch & field interval standards
National Assn of EMS Physicians. Mosby-Year Book., 1993, pp. 36-48.

California Statewide EMS System Evaluation Project
EMS SYSTEM PERFORMANCE INDICATOR

ON SCENE TIME TO FIRST DEFIBRILLATION

DEFINITIONS

On Scene Time: the lapse of time a responding unit takes between the time of arrival on scene and the first shock of defibrillatior.
Lapse of time: the recorded interval in minutes and/or seconds between time of arrival and time of first shock of defibrillator.
Arrival on scene: The time when the responding unit reports that they have reached the location as requested by dispatch agency.
Time first shock: the time when a responding unit is delivers first shock from defibrillator.
Resp Unit: a public or private EMS response agency capable of providing defibrillation.
Patient: patients who access an organized EMS system.
Cardiac Arrest: documented absence of pulse and respirations
Defibrillation: delivery of trans-thoracic electrical current by EMS personnel

REPORTING:

Indicator item: Average/mean time to first shock in minutes/seconds per patient cases where defibrillation was performed. (aggregate summary)
reportformula: total cumulative roll times in seconds divided by total patient cases where defibrillation was administered by prehospital personnel.

data points:

-inclusion crit: all patients age 15 yrs or older where defibrillation was administered by prehospital personnel.
numerator: total number of seconds for all time to first shock
denominator: total number of patient where defib administered
convert mins: not applicable
min points: n = 30
report period: monthly or annually (minimum 12 consecutive months)
data source: PSAP records/patient care documents times estimated by prehospital personnel

REPORTING EXAMPLE

reporting period:	**Jan to Mar 1999**
numerator =	**Time to First Shock- cumulative seconds = 2400 s**
denominator =	**total number of patient defibrillated (N= 50)**
formula =	**numerator/denominator = 2400 s /50 = 48 s**

ANALYSIS

Central Tendency: Mean - Mode -Standard Deviation
Process: Variation - Special Causation
Outcome: Benchmark Comparison - Best Practices

BENCHMARK REFERENCES

TBD - baseline data collection

California Statewide EMS System Evaluation Project
EMS SYSTEM PERFORMANCE INDICATOR

PREHOSPITAL DEFIBRILLATION SURVIVAL TO HOSPITAL ADMISSION

DEFINITIONS

% survival	percentage (%) of patients defibrillated in cardiac arrest who survive to hospital admission.
Defibrillation:	delivery of trans-thoracic electrical current by EMS personnel
cardiac arrest :	patients with documented absence of pulse and respirations witnessed or unwitnessed - non traumatic etiology
hospital admission	patient accepted for admission or transferred for admission by an acute care facility from a emergency department or a approved receiving facility

REPORTING:

indicator item:	% survival to admission rate per total cases (aggregate summary)
report formula:	total survival to admission divided by total patients defibrillated x 100 = %
data points:	
inclusion criteria:	all patients defibrillated by EMS personnel
numerator:	patients admitted to a hospital after prehospital defibrillation.
denominator:	total number of patients who were defibrillated
minimum points:	N=30
reporting period:	monthly or annually (minimum of 12 consecutive months)
data source:	patient care documents (document by EMS personnel) hospital admission records

REPORTING EXAMPLE

reporting period:	**Month of 7/99**
numerator =	**total number of patients admitted to hospital (N= 7)**
denominator =	**total number of patients defibrillated (N=44)**
formula =	**numerator/denominator x 100 = % (7/44) x 100 =15 %**
summary indicator reported item =	**15% survival to admission (Prehospital Defibrillation)**

ANALYSIS:

Benchmark Comparison - Best Practices

BENCHMARK REFERENCES

1. Kass LE. One Year Survival after Prehospital Cardiac Arrest: The Utstein Model applied to Rural-Suburban EMS System. Ann of Emerg Med; 12:17-20, 1994
2. Wisconsin study
   Olson DW, MD. EMT-Defibrillation: The Wisconsin Experience.
   Ann of Emerg Med, 18:8;806. 1989
1. UCS, Calllahan M. Relationship of timeliness of Paramedic ALS intervention to Outcome of Out of Hospital Cardiac Arrest. Ann of Emerg Med 27:637-648, 1996.
2. Albert Einstein College of Medicine, NY
   Gallagher M. Survival Variation in Cardiac Arrest occurring after EMS Arrival.
   Albert Einstein College of Medicine, NY. 1995.

California Statewide EMS System Evaluation Project
EMS SYSTEM PERFORMANCE INDICATOR

PREHOSPITAL DEFIBRILLATION
RETURN OF SPONTANEOUS CIRCULATION (ROSC)

DEFINITIONS

Prehospital Patient:	patients who access an organized EMS system
Cardiac arrest:	documented absence of pulse and respirations
ROSC Survival:	return of a palpable pulse at any site
Survival rate:	the number of patients who survive to ROSC after receiving one or more shocks by prehospital personnel

REPORTING

	Aggregate - % survival to ROSC rate per annual total cases
indicator item	% survival to ROSC (aggregate summary)
reporting formula	total survival to ROSC divided by total patients defibrillated x 100 = %
data points:	
inclusion criteria:	all patients defbrillated by EMS personnel
numerator:	patients with documented ROSC after defibrillation
denominator:	total number of patients defibrillated
	minimum points: N=30
reporting period:	monthly or annually (minimum of 12 consecutive months)
data source:	patient care documents (document by EMS personnel)

REPORTING EXAMPLE

reporting period:	**Month of 7/99**
numerator =	**total number of patients with documented ROSC (N= 12)**
denominator =	**total number of patients defibrillatedt (N=44)**
formula =	**numerator/denominator x 100 = % (12/44) x 100 =27 %**

summary indicator reported item = 27% ROSC post defib survival

ANALYSIS:

Outcome:
Benchmark Comparison - Best Practices

BENCHMARK REFERENCES

TBD – To Be Determined by Base Line EMS data Collection

California Statewide EMS System Evaluation Project
EMS SYSTEM PERFORMANCE INDICATOR

PREHOSPITAL DEFIBRILLATION
% DISCHARGED FROM HOSPITAL ALIVE

DEFINITIONS

% discharged	percentage (%) of patients defibrillated in cardiac arrest who survive to hospital discharge.
Defibrillation:	delivery of trans-thoracic electrical current by EMS personnel
cardiac arrest :	patients with documented absence of pulse and respirations witnessed or unwitnessed - non traumatic etiology
hospital discharge:	patient discharged from hospital alive

REPORTING:

indicator item	% discharged per total cases (aggregate summary)
reporting formula	total discharged divided by total patients defibrillated x 100 = %
data points:	
inclusion criteria:	all patients defibrillated by EMS personnel
numerator:	patients discharged alive from hospital after prehospital defibrillation
denominator:	total number of patients who were
minimum points:	N=30
reporting period:	monthly or annually (minimum of 12 consecutive months)
data source:	hospital discharge records

REPORTING EXAMPLE

reporting period:	**Month of 7/99**
numerator =	**total number of patients discharged from hospital (N= 5)**
denominator =	**total number of patients defibrillated (N=44)**
formula =	**numerator/denominator x 100 = % (5/44) x 100 =11.3 %**
summary indicator reported item =	**11.3% survival to discharge(Prehospital Defibrillation)**

ANALYSIS

Benchmark Comparison - Best Practices

BENCHMARK REFERENCES

1. **K**ass LE. One Year Survival after Prehospital Cardiac Arrest: The Utstein Model applied to Rural-Suburban EMS System. Ann of Emerg Med; 12:17-20, 1994
2. Olson DW, MD. EMT-Defibrillation: The Wisconsin Experience. Ann of Emerg Med, 18:8;806. 1989
3. Callahan M. Relationship of timeliness of Paramedic ALS intervention to Outcome of Out of Hospital Cardiac Arrest. Ann of Emerg Med 27:637-648, 1996.
4. Albert Einstein College of Medicine, NY
   Gallagher M. Survival Variation in Cardiac Arrest occurring after EMS Arrival.
   Albert Einstein College of Medicine, NY 1995

EMS SYSTEM EVALUATION

STANDARDIZED INDICATORS

Indicator Development

What are Standardized Indicators?

An indicator is a quantitative performance measure that can be used to monitor and improve the quality of important governance, management, clinical and support services that affect patient outcomes. An indicator is not a direct measurement oif performance. [1] Rather, it is a tool that can be used to monitor performance and direct attention to potential performance issues. The indicator is used as a tool to define and focus upon a question. Once defined, the indicator identifies the data and attempts to answer the question by measuring and presenting the result of the study. The type of indicator is dependent upon the primary focus of the study.

What are the different types of indicators and how do they relate to EMS?

Indicators can be long term/continuous focusing mostly on retrospective data or short term utilizing real time data. Indicators are also classified by the what they study (structure, process, and outcome) and by the inclusiveness of the data (rate vs sentinel). Structural indicators measure static components of a system such as the number of hospitals in a specific geographic area. Process indicators measure the activity of a system such as the average Atime to defibrillation@ for cardiac arrest patients. Outcome indicators measure the result of the structural and process indicators. An example of a outcome indicator would be cardiac arrest survival.

Theoretically, improving a structural or process indicator should have a direct improvement on an outcome. In other words, if there are more hospitals in a geographic area (structural), and the shorter the time to defibrillation (process), then one would expect a higher cardiac survival rate (outcome). Thus, the following equation represents the relationship between the three classes of indicators;

structure + process = outcome.

Depending upon the focus of the study, EMS systems can choose the most appropriate types of indicators based upon what questions they wish to answer. The project staff chose and developed nine indicators with the consensus of our advisory team.

[1] Development & Application of Indicators in Emergency Care. JCHO 1991. pg 11

How were these indicators chosen and developed?

Project staff began with the recommendations of the NHTSA publication; *A leadership Guide to Quality Improvement.* The NHTSA guidelines recommend starting with the basic components of the EMS system and then holding strategic planning sessions[2]*.* Such strategic planning sessions where held by the project advisory team, and by participation in the state Vision Group activities and conference in December of 1998. Once a list of indicators was brain stormed through planning sessions, they were then sent out for survey to different constituent groups to be prioritized. The list was finalized in June of 1998. The following pages show the completed indicators,

[2] Leadership Guide to Quality Improvement; National Highway & Transportation Safety Administration; Pages 26-35. July 1997

EMS SYSTEM EVALUATION PROJECT
KEY PERFORMANCE INDICATORS

Glossary of Terms

INDICATOR: A measurable statement that is consistent with the EMS system mission and expected performance requirements

DEFINITION: a specific description, diagram or explanation of steps or terms within the structure, process, or outcome indicator which is being measured

COMPLIANCE: The acceptable threshold of measurable performance as defined in the indicator statement.

BENCHMARK: an established measurable performance level as determined by consensus practices of system participants and based upon documented Abest practices@ or baseline data analysis.

REFERENCES: published materials which document measurable results that are comparable or relevant to the indicator, and/or demonstrate a model for Abest practices@.

REPORTING: the format, style or conditions applicable to communicating results of a specific data collection process for the purposes of quality improvement evaluation.

CLASSIFICATION:

Structural B a physical attribute or fact about the system. ie: 1 amb/100 people
Process B activity which occurs within a system. ie: defibrillation
Outcome B the results of a structure and process. ie; survival rates

California Statewide EMS System Evaluation Project

EMS SYSTEM PERFORMANCE INDICATOR

ORAL ENDOTRACHEAL INTUBATION (ET) SKILL SUCCESS RATE - ADULT

DEFINITIONS

skill success rate: -percentage (%) of successful placements of oral endotracheal tubes by EMS personnel per patient case

patient case: -an individual patient which EMS personnel have performed one or more attempts to orally insert an endotracheal tube in the trachea

success: -correct oral placement of a endotracheal tube within a patient as indicated by the presence of (+) bilateral lung sounds and (-) gastric sounds through auscultation or other acceptable adjuncts/tests.

adult: -patients who have reached the age of 15 years or more

REPORTING

Indicator item: -% success rate per patient case (aggregate summary)

reporting formula: total success divided by total patient cases x 100 = %

data points:
- -inclusion criteria: all patients age 15 yrs or older treated by EMS personnel
- -numerator: total number of patients where oral endotracheal intubations was successful
- -denominator: total number of patients where oral endotracheal intubation was attempted one or more times
- -minimum points: n = 30

reporting period -monthly or annually (minimum 12 consecutive months)

data source: -patient care documents (completed by EMS personnel)

REPORTING EXAMPLE

reporting period:	**Month of 7/99**
numerator =	**total number of successful intubations (N= 1268)**
denominator =	**total number of patient cases (N= 1421)**
formula =	**numerator/denominator x 100 = % (1268/1421) x 100 = 89 %**
summary indicator reported item =	**89% success oral intubation - adult**

ANALYSIS: -Process: Variation - Special Causation

-Outcome: Benchmark Comparison - Best Practices

BENCHMARK REFERENCES

1 88% success rate B (Newark, NJ. high/volume inner city)
Krisanda, Thomas J, M.D., An Analysis of Invasive Airway Management in Suburban EMS System. Prehospital & Disaster Medicine; 1992 April-June, Vol 7, No 2, pages 121-123.

2 86% success rate B (Delaware, frequency vs Success)
O=Connor Robert, M.D. ET field experience: paramedics to proficiency, Prehospital & Disaster Medicine: 1995; Vol 10, No 4 (sup) S23.

3 83% success rate B (Tacoma, Wash. ET in out of hospital cardiac arrest)
Shirk, Tracey M.D., Comparison of ETC in out of hospital cardiac arrest; Prehospital & Disaster Medicine; 1995; Vol 10, No 4 (sup) S033.

4 86% success rate B (Paramedics: ET during CPR)
Smale JR., Endotracheal intibation by paramedics during in-hospital CPR; Chest: June 1995; Vol 7, pages 1661-1665

5 86% success rate B (ET with manikins and human subjects)
Stratton, SJ, M.D., Prospective study of manniquins and human subjects for endotracheal intubation training for paramedics. Ann of Emerg Med; 1991, Vol 20, Pages 1314-1318

CLASSIFICATION - Process - Prehospital Medical Care

PEDIATRIC ORAL ENDOTRACHEAL INTUBATION
SUCCESS RATE

DEFINITIONS success rate: aggregate percentage (%) of successful placements of oral endotracheal tubes by paramedics per each patient attempt.
attempt: insertion of a laryngoscope blade beyond the teeth with the intent of placing an endotracheal tube in a individual patient.
success: correct oral placement of a endotracheal tube within a patient as indicated by the presence of (+) bilateral lung sounds and (-) gastric sounds through auscultation or other acceptable adjuncts/tests.
pediatric: patients less than ten (10) years of age*

REPORTING: Aggregate - % success rate per (period of time)
Formula - total success divided by total attempt x 100 = %
Data points- total attempts oral endotracheal intubations
total successful oral endotracheal intubations
Data Source- Patient Care Documents (document by EMS personnel)

ANALYSIS: Process Variation - Special Causation
Benchmark Comparison - Best Practices

STATE BENCHMARK: TBD by baseline data collection

BENCHMARK REFERENCES

1. 91.6% Success Rate
Los Angeles County EMS Agency; Pediatric Airway Management Study. 1997

* Anatomical Differences between Children and Adults; definition as reported by AHA; Advanced Cardiac Life Support Texbook. AHA pg 1-61. 1994.

CLASSIFICATION - Process
Key Component: Prehospital Medical Care
Key Performance Area: Prehospital

PERIPHERAL INTRAVENOUS (IV) SKILL SUCCESS RATE - ADULT

DEFINITIONS

success rate:	-percentage (%) of successful placement of peripheral intravenous access device by EMS personnel per each patient
patient case:	-an individual patient which EMS personnel have performed one or more attempts to puncture of the skin with a needle catheter device with intent gain access to peripheral venous circulation
success:	-access to peripheral venous circulation as evidenced by ability to infuse intravenous fluids.
adult:	-patients who have reached the age of 15 years or more

REPORTING

format:	-% success rate per (aggregate summary)	
reporting formula -	-total number success divided by total number patient cases x 100 = %	
data points-	-inclusion criteria:	all patients age 15 yrs or older treated by EMS personnel
	-numerator:	total number of patients where peripheral IV was successful
	-denominator:	total number of patients cases
	-minimum points	n = 30
reporting period	-monthly or annually (minimum12 consecutive months)	
data source-	-patient care documents (document by EMS personnel)	

REPORTING EXAMPLE

reporting period:	**Month of 7/99**
numerator =	**total number of successful peripheral IVs (N= 1769)**
denominator =	**total number of patient cases (N= 2021)**
formula =	**numerator/denominator x 100 = % (1769/2021) x 100 = 87 %**
summary indicator reported item =	**87% success peripheral IV - adult**

ANALYSIS: Process: Variation - Special Causation
Outcome: Benchmark Comparison - Best Practices

STATE BENCHMARK = TBD by baseline data collection

BENCHMARK REFERENCES

10 91% success rate B LA/USC
Jones SE, Nesper TP, Alcouloumre E. Prehospital intravenous line placement: A prospective study. Ann Emerg Med 18:244, 1989.

20 71% success rate B University of Arizona; urban vs non urban
Spaite DW, Valenzuela TD, Meislen HW, Criss EA. A prospective comparison of intravenous line placement by urban & non urban ALS personnel. Prehospital & Disaster Medicine; Sup 13S, Jul 1992.

30 80% success rate B Pittsburg PA. Saline Lock
Carducci B. Intravenous maintenance with saline lock in prehospital enviroment. Prehospital & Disaster Medicine; 9:67, Jan 1994

CLASSIFICATION

Type:	*Process*
Component:	*Prehospital Medical Care*
Key Performance Area:	*Prehospital*

TREATMENT GUIDELINE-PROTOCOL COMPLIANCE (TGC) RATE
TREATMENT POINT COMPLIANCE (TPC) RATE

CORONARY ISCHEMIC CHEST PAIN

DEFINITIONS

Compliance: Prehospital treatment to include modalities, procedures, dosages, and routes provided to the appropriate patient, time, and order, WITHIN the indicated range of adult ALS treatment guideline-protocol: as published in the most recent version of local EMS agency ALS treatment guidelines protocols.

CORONARY ISCHEMIC CHEST PAIN

Treatment Compliance Points (TCP)

1. Oxygen administration
2. EKG monitor
3. Peripheral IV access
4. Administration of aspirin
5. Administration of nitroglycerine
6. Administration of morphine sulfate

Treatment Guideline Compliance Rate: total % compliance per total cases

Treatment Compliance Point Rate (TCP): Total % patients receiving each TCP

REPORTING: Aggregate - % compliance rate per total cases (period of time)
- % compliance rate per each TCP (period of time)

Formula - total compliance divided by total cases x 100 = %

Data points- -inclusion: all pts coded with coronary ischemic chest pain
-pts who received all of above (1-6) treatments
-pts who recieved one of above (1-6)

Data Source- Patient Care Documents (document by EMS personnel)

ANALYSIS: Process Variation - Special Causation
Benchmark Comparison - Best Practices
Expected vs Actual Treatment

STATE BENCHMARK: TBD by baseline data collection

BENCHMARK REFERENCES

10 98% Compliance B UCLA; EMT-P deviations from protocols
Hoffman JR: Does paramedic base hospital contact result in beneficial deviations from protocols?, West J Med 153: P 283-287, 1990

20 97% Compliance B Univ of Michigan; EMT-P, QA Audit
Swor, RA: A paramedic peer review quality assurance audit, Pre Hospiatl & Disaster Medicine 6:3 321-326, 1991

30 98% Compliance B Univ of Michigan, EMT-P, computer assisted QA
Swor, RA: A computer assisted quality assurance audit in a multi-provider EMS system, Ann of Emerg Med 19:286-290, 1990

40 97% compliance B Drew Medical, LA. Deviations from protocol
Wasserberger J, MD. Base station prehospital care: judgment errors and deviations from protocol. Ann of Emerg Med 16:8, 867-869, 1987.

ASSESSMENT BASED TREATMENT (TX)
ADULT RESPIRATORY DISTRESS (ARD) WITH WHEEZES
% COMPLIANCE - OXYGEN

DEFINITIONS

% compliance:	Percentage (%) of patients assessed by EMS personnel as having respiratory distress with wheezes who receive oxygen
assessment:	An appraisal or evaluation of a patients medical condition by EMS personnel
respiratory distress:	Any combination of signs and symptoms which demonstrate a patient is experiencing a serious or life threatening (non traumatic) medical condition involving the respiratory system.
wheezes:	The production of whistling sounds during difficulty breathing such as occurs during asthma, croup, emphysema and other respiratory disorders
TX compliance:	Prehospital treatment to include modalities, procedures, dosages, and routes provided to the appropriate patient, time, and order, WITHIN the indicated range of adult ALS treatment guideline-protocol: as published in the most recent version of local EMS agency ALS treatment guidelines protocols
adult	Patients who have reached the age of 15 years or more
oxygen	medical gas given for emergency treatment of respiratory distress

REPORTING

indicator item	% compliance oxygen rate per total cases (aggregate summary)
reporting formula	total patients receiving oxygen divided by total patients assessed x 100 =%
data points:	inclusion criteria: patients age 15 or older assessed by EMS personnel numerator: total number of patients who receive oxygen denominator: total number of patients cases assessed by EMS personnel as having respiratory distress with wheezes minimum points: n = 30
time period:	monthly or annually (minimum of 12 consecutive months)
data source:	patient care documents (document by EMS personnel)

REPORTING EXAMPLE

ANALYSIS:
Process: Variation - Special Causation
Outcome: Benchmark Comparison - Best Practices
Expected vs Actual Treatment

reporting period: Month of 7/99
numerator = total number of adult patients receiving oxygen (N= 2290)
denominator = total number of patient assessed - resp distress w wheezes (N=2296)
formula = numerator/denominator x 100 = % (2290/2296) x 100 = 99 %
summary indicator reported item = 99% compliance - oxygen (ARD w Wheezes)

BENCHMARK REFERENCES

10 98% Compliance B UCLA, EMT-P deviations from protocols
Hoffman JR: Does paramedic base hospital contact result in beneficial deviations from protocols?.
West J Med 153: P 283-287, 1990

20 97% Compliance B Univ of Michigan; EMT-P, QA Audit
Swor, RA: A paramedic peer review quality assurance audit, Pre Hospiatl & Disaster Medicine 6:3
321-326, 1991

30 98% Compliance B Univ of Michigan, EMT-P, computer assisted QA
Swor, RA: A computer assisted quality assurance audit in a multi-provider EMS system,
Ann of Emerg Med 19:286-290, 1990

40 97% compliance B Drew Medical, LA. Deviations from protocol
Wasserberger J, MD. Base station prehospital care: judgment errors and deviations from protocol.
Ann of Emerg Med 16:8, 867-869, 1987.

ASSESSMENT BASED TREATMENT (TX)
PEDIATRIC RESPIRATORY DISTRESS (PRD) WITH WHEEZES

% COMPLIANCE - OXYGEN

DEFINITIONS

% compliance:	Percentage (%) of patients assessed by EMS personnel as having respiratory distress with wheezes who receive oxygen
assessment:	An appraisal or evaluation of a patients medical condition by EMS personnel
respiratory distress:	Any combination of signs and symptoms which demonstrate a patient is experiencing a serious or life threatening (non traumatic) medical condition involving the respiratory system.
wheezes:	The production of whistling sounds during difficulty breathing such as occurs during asthma, croup, emphysema and other respiratory disorders
TX compliance:	Prehospital treatment to include modalities, procedures, dosages, and routes provided to the appropriate patient, time, and order, WITHIN the indicated range of adult ALS treatment guideline-protocol: as published in the most recent version of local EMS agency ALS treatment guidelines protocols
pediatric	Patients who have not reached their 15th birthday
oxygen	medical gas given for emergency treatment of respiratory distress

REPORTING

indicator item	% compliance oxygen rate per total cases (aggregate summary)
reporting formula	total patients receiving oxygen divided by total patients assessed x 100 =%
data points:	inclusion criteria: patients who have not reached their 15th birthday who are assessed by EMS personnel numerator: total number of patients who receive oxygen denominator: total number of patients assessed by EMS personnel as having respiratory distress with wheezes minimum points: n = 30
time period:	monthly or annually (minimum of 12 consecutive months)
data source:	patient care documents (document by EMS personnel)

REPORTING EXAMPLE

Reporting period:	**Month of 7/99**
numerator =	**total number of pediatric patients receiving oxygen (N= 290)**
denominator =	**total number of pediatric patient assessed-PRD w wheezes (N=296)**
formula =	**numerator/denominator x 100 = % (290/296) x 100 = 98 %**
summary indicator reported item =	**98% compliance - oxygen (PRD w Wheezes)**

ANALYSIS

Process: Variation - Special Causation
Outcome: Benchmark Comparison - Best Practices
Expected vs Actual Treatment

BENCHMARK REFERENCES

10 98% Compliance B UCLA; EMT-P deviations from protocols
Hoffman JR. Does paramedic-base hospital contact result in beneficial deviations from protocols?, West J Med 153: P 283-287, 1990

20 97% Compliance B Univ of Michigan; EMT-P, QA Audit
Swor, RA: A paramedic peer review quality assurance audit, Pre Hospiatl & Disaster Medicine 6:3 321-326, 1991

30 98% Compliance B Univ of Michigan, EMT-P, computer assisted QA
Swor, RA: A computer assisted quality assurance audit in a multi-provider EMS system, Ann of Emerg Med 19:286-290, 1990

40 97% compliance B Drew Medical, LA. Deviations from protocol
Wasserberger J, MD. Base station prehospital care: judgment errors and deviations from protocol. Ann of Emerg Med 16:8, 867-869, 1987.

ASSESSMENT BASED TREATMENT (TX)
ADULT RESPIRATORY DISTRESS (ARD) WITH WHEEZES
% COMPLIANCE - BRONCHODILATOR

DEFINITIONS

% compliance:	Percentage (%) of patients assessed by EMS personnel as having

respiratory distress with wheezes who receive a bronchodilator medication

assessment: An appraisal or evaluation of a patients medical condition by EMS personnel

respiratory distress: Any combination of signs and symptoms which demonstrate a patient is experiencing a serious or life threatening (non traumatic) medical condition involving the respiratory system.

wheezes: The production of whistling sounds during difficulty breathing such as occurs during asthma, croup, emphysema and other respiratory disorders

TX compliance: Prehospital treatment to include modalities, procedures, dosages, and routes provided to the appropriate patient, time, and order, WITHIN the indicated range of adult ALS treatment guideline-protocol: as published in the most recent version of local EMS agency ALS treatment guidelines protocols

adult Patients who have reached the age of 15 years or more

bronchodilator A drug that expands the bronchial tubes by relaxing the bronchial muscles

REPORTING

indicator item % compliance rate per total cases (aggregate summary)

reporting formula total patients receiving bronchodilator medication divided by total patients assessed with resp distress w wheezes x 100 =%

data points: inclusion criteria: patients age 15 or older assessed by EMS personnel
numerator: total number of patients who receive bronchodilator medication
denominator: total number of patients cases assessed by EMS personnel as having respiratory distress with wheezes
minimum points: n = 30

time period: monthly or annually (minimum of 12 consecutive months)

data source: patient care documents (document by EMS personnel)

REPORTING EXAMPLE

reporting period: Month of 7/99
numerator = total number of adult patients receiving bronchodilator med (N= 2290)
denominator = total number of adult patient assessed - resp distress w wheezes (N=2296)
formula = numerator/denominator x 100 = % (2290/2296) x 100 = 99 %
summary indicator reported item = 99% compliance - oxygen (ARD w Wheezes)

ANALYSIS Process: Variation - Special Causation
Outcome: Benchmark Comparison - Best Practices
Expected vs Actual Treatment

BENCHMARK REFERENCES

1. 98% Compliance B UCLA; EMT-P deviations from protocols
Hoffman JR: Does paramedic base hospital contact result in beneficial deviations from protocols?, West J Med 153: P 283-287, 1990
2. 97% Compliance B Univ of Michigan; EMT-P, QA Audit
Swor, RA: A paramedic peer review quality assurance audit, Pre Hospiatl & Disaster Medicine 6:3 321-326, 1991
3. 98% Compliance B Univ of Michigan, EMT-P, computer assisted QA
Swor, RA: A computer assisted quality assurance audit in a multi-provider EMS system, Ann of Emerg Med 19:286-290, 1990
4. 97% compliance B Drew Medical, LA. Deviations from protocol
Wasserberger J, MD. Base station prehospital care: judgment errors and deviations from protocol. Ann of Emerg Med 16:8, 867-869, 1987.

California Statewide EMS System Evaluation Project

EMS SYSTEM PERFORMANCE INDICATOR

ASSESSMENT BASED TREATMENT (TX)
PEDIATRIC RESPIRATORY DISTRESS (ARD) WITH WHEEZES
% COMPLIANCE - BRONCHODILATOR

DEFINITIONS

% compliance: Percentage (%) of pediatric patients assessed by EMS personnel as having respiratory distress with wheezes who receive a bronchodilator medication

assessment: An appraisal or evaluation of a patients medical condition by EMS personnel

respiratory distress: Any combination of signs and symptoms which demonstrate a patient is experiencing a serious or life threatening (non traumatic) medical

condition involving the respiratory system.

wheezes: The production of whistling sounds during difficulty breathing such as occurs during asthma, croup, emphysema and other respiratory disorders

TX compliance: Prehospital treatment to include modalities, procedures, dosages, and routes provided to the appropriate patient, time, and order, WITHIN the indicated range of adult ALS treatment guideline-protocol: as published in the most recent version of local EMS agency ALS treatment guidelines protocols

pediatric Patients who have not yet reached their 15th birthday

bronchodilator A drug that expands the bronchial tubes by relaxing the bronchial muscles

REPORTING

indicator item % compliance rate per total cases (aggregate summary)

reporting formula total pediatric patients receiving bronchodilator medication divided by total patients assessed with resp distress w wheezes x 100 =%

data points: inclusion criteria: Patients who have not yet reached their 15th birthday who were assessed by EMS personnel

numerator: total number of patients who receive bronchodilator medication

denominator: total number of patients cases assessed by EMS personnel as having respiratory distress with wheezes

minimum points: n = 30

time period: monthly or annually (minimum of 12 consecutive months)

data source: patient care documents (document by EMS personnel)

REPORTING EXAMPLE

reporting period: Month of 7/99

numerator = total number of pediatric patients receiving bronchodilator med (N= 2290)

denominator = total number of pediatric patients assessed - resp distress w wheezes (N=2296)

formula = numerator/denominator x 100 = % (2290/2296) x 100 = 99 %

summary indicator reported item = 99% compliance - oxygen (PRD w Wheezes)

ANALYSIS: Process: Variation - Special Causation
Outcome: Benchmark Comparison - Best Practices
Expected vs Actual Treatment

BENCHMARK REFERENCES

1. 98% Compliance B UCLA-EMT-P deviations from protocols
Hoffman JR: Does paramedic base hospital contact result in beneficial deviations from protocols?, West J Med 153: P 283-287, 1990
2. 97% Compliance B Univ of Michigan; EMT-P, QA Audit
Swor, RA: A paramedic peer review quality assurance audit, Pre Hospiatl & Disaster Medicine 6:3 321-326, 1991
3. 98% Compliance B Univ of Michigan, EMT-P, computer assisted QA
Swor, RA: A computer assisted quality assurance audit in a multi-provider EMS system, Ann of Emerg Med 19:286-290, 1990
4. 97% compliance B Drew Medical, LA. Deviations from protocol
Wasserberger J, MD. Base station prehospital care: judgment errors and deviations from protocol.

CARDIAC ARREST (NON TRAUMATIC)
% SURVIVAL TO HOSPITAL ADMISSION

DEFINITIONS

% survival	percentage (%) of patients in cardiac arrest who survive to hospital admission.
cardiac arrest event	patients with documented absence of pulse and respirations witnessed or unwitnessed - non traumatic etiology
hospital admission	patient accepted for admission or transferred for admission by an acute care facility from a emergency department or a approved receiving facility

REPORTING:

indicator item	% survival to admission rate per total cases (aggregate summary)
reporting formula	total survival to admission divided by total cardiac arrest patients x 100 = %
data points:	inclusion criteria: all patients in non traumatic cardiac arrest (witnessed & unwitnessed)as documented by EMS personnel
	numerator: patients admitted to a hospital after cardiac arrest event
	denominator: total number of cardiac arrest patients
	minimum points: N=30
reporting period:	monthly or annually (minimum of 12 consecutive months)
data source:	patient care documents (document by EMS personnel) hospital admission records

REPORTING EXAMPLE

reporting period:	**Month of 7/99**
numerator =	**total number of patients admitted to hospital (N= 12)**
denominator =	**total number of patients in cardiac arrest (N=44)**
formula =	**numerator/denominator x 100 = % (12/44) x 100 =27 %**
summary indicator reported item =	**27% survival to admission (cardiac arrest)**

ANALYSIS: Outcome: Benchmark Comparison - Best Practice

STATE BENCHMARK: TBD by baseline data collection

BENCHMARK REFERENCES

1. 25% Survival Bwitnessed B Utstein Model; Pitt, Penn
   Kass LE. One Year Survival after Prehospital Cardiac Arrest: The Utstein Model applied to Rural-Suburban EMS System. Ann of Emerg Med; 12:17-20, 1994
2. 42% Survival B witnessed, Wisconsin study
   Olson DW, MD. EMT-Defibrillation: The Wisconsin Experience. Ann of Emerg Med, 18:8;806. 1989
3. 25 % Survival Bwitnessed B UCSF
   Callahan M. Relationship of timliness of Paramedic ALS intervention to Outcome of Out of Hospital Cardiac Arrest. Ann of Emerg Med 27:637-648, 1996.
4. 25% Survival-witnessed B Albert Einstein College of Medicine, NY
   Gallagher M. Survival Variation in Cardiac Arrest ocurring after EMS Arrival. Albert Einstein College of Medicine, NY. 1995.

CLASSIFICATION
Component: Prehospital Medical Care
Key Performance Area: Hospital-Prehospital
Type: Outcome

California Statewide EMS System Evaluation Project
EMS SYSTEM PERFORMANCE INDICATOR

CARDIAC ARREST (NON TRAUMATIC) % TRANSPORTED TO HOSPITAL

DEFINITIONS

% transported	percentage (%) of patients in cardiac arrest who are transported from scene by EMS personnel to hospital or other acute care facility
cardiac arrest event	patients with documented absence of pulse and respirations witnessed or unwitnessed - non traumatic etiology

REPORTING:

indicator item	% transported to hospital per total cardiac arrest (aggregate summary)
reporting formula	total survival to admission divided by total cardiac arrest patients x 100 = %
data points:	inclusion criteria: all patients in non traumatic cardiac arrest (witnessed & unwitnessed)as documented by EMS personnel
	numerator: patients transported from scene to a acute care facility
	denominator: total number of cardiac arrest patients
	minimum points: N=30
reporting period:	monthly or annually (minimum of 12 consecutive months)
data source:	patient care documents (document by EMS personnel)
	hospital admission records

REPORTING EXAMPLE

reporting period:	**Month of 7/99**
numerator =	**total number of patients transported to hospital (N= 22)**
denominator =	**total number of patients in cardiac arrest (N=44)**
formula =	**numerator/denominator x 100 = % (22/44) x 100 =50 %**
summary indicator reported item =	**50% transported to hospital (cardiac arrest)**

ANALYSIS: Outcome: Benchmark Comparison - Best Practices

STATE BENCHMARK: TBD by baseline data collection

BENCHMARK REFERENCES

TBD

CLASSIFICATION
Component: Prehospital Medical Care
Key Performance Area: Hospital-Prehospital
Type: Outcome

Statewide EMS System Evaluation Project

SYSTEM PERFORMANCE INDICATOR

CARDIAC ARREST (WITNESSED) SURVIVAL RATE
HOSPITAL DISCHARGE ALIVE

DEFINITIONS Prehospital Patient: -patients who access an organized EMS system

Cardiac arrest: -documented absence of pulse and respirations
Witnessed: -condition occurred in presence of Bystanders or -
trained EMS personnel. CPR initiated within 1 min
Survival to discharge: return of spontaneous circulation-discharged
from hospital alive.
Survival rate: -the number of patients discharged from hospital
divided by the number of patients with witnessed
cardiac arrest of cardiac etiology

REPORTING: Aggregate - % survival to discharge alive rate per total cases
Formula - total survival to discharge divided by total cases x 100 = %
Data points- -inclusion: all pts coded with cardiac arrest - witnessed
-pts discharged from hospital after return of spontaneous
circulation
Data Source- Patient Care Documents (document by EMS personnel)
Hospital admission records

ANALYSIS: Benchmark Comparison - Best Practices

STATE BENCHMARK: TBD by baseline data collection

BENCHMARK REFERENCES

1. 25% Survival Bwitnessed B Utstein Model; Pitt, Penn
Kass LE. One Year Survival after Prehospital Cardiac Arrest: The Utstein Model applied to Rural-Suburban EMS System.
Ann of Emerg Med; 12:17-20, 1994
2. 42% Survival B witnessed, Wisconsin study
Olson DW, MD. EMT-Defibrillation: The Wisconsin Experience.
Ann of Emerg Med, 18:8;806. 1989
3. 25 % Survival Bwitnessed B UCSF
Callahan M. Relationship of timliness of Paramedic ALS intervention to Outcome of Out of Hospital Cardiac Arrest.
Ann of Emerg Med 27:637-648, 1996.
4. 25% Survival-witnessed B Albert Einstein College of Medicine, NY
Gallagher M. Survival Variation in Cardiac Arrest ocurring after EMS Arrival.
Albert Einstein College of Medicine, NY. 1995.

CLASSIFICATION
Component: Prehospital Medical Care
Key Performance Area: Hospital-Prehospital
Type: Outcome

Statewide EMS System Evaluation Project

SYSTEM PERFORMANCE INDICATOR

CARDIAC ARREST (UNWITNESSED) SURVIVAL RATE
HOSPITAL ADMISSION

DEFINITIONS Prehospital Patient: -patients who access an organized EMS system
Cardiac arrest: -documented absence of pulse and respirations
Witnessed: -condition did not occur in presence of Bystanders or
trained EMS personnel. Survival to discharge: return
of spontaneous circulation-admitted to hospital alive.
Survival rate: -the number of patients admitted to hospital alive
divided by the number of patients with unwitnessed
cardiac arrest of cardiac etiology

REPORTING: Aggregate - % survival to admission alive rate per total cases
Formula - total survival to admission divided by total cases x 100 = %
Data points- -inclusion: all pts coded with cardiac arrest - unwitnessed
-pts admitted to hospital after return of spontaneous
circulation
Data Source- Patient Care Documents (document by EMS personnel)
Hospital admission records

ANALYSIS: Benchmark Comparison - Best Practices

STATE BENCHMARK: TBD by baseline data collection

BENCHMARK REFERENCES

1. 6.0% Survival Bunwitnessed B Utstein Model; Pitt, Penn
   Kass LE. One Year Survival after Prehospital Cardiac Arrest: The Utstein Model applied to Rural-Suburban EMS System. Ann of Emerg Med; 12:17-20, 1994
2. 6.4% Survival B unwitnessed, Wisconsin study
   Olson DW, MD. EMT-Defibrillation: The Wisconsin Experience. Ann of Emerg Med, 18:8;806. 1989
3. 6.0 % Survival Bunwitnessed B Seattle, Washington
   Weaver DW, MD. Considerations for Improving Survival from Out of Hospital Cardiac Arrest. Ann of Emerg Med 15:10;1181, 1986.
4. 2.5% Survival-unwitnessed B Ontario, Canada
   Brison RJ. Cardiac Arrest in Ontario; Can Med Assoc J; 191-199, 1992

CLASSIFICATION
Component: Prehospital Medical Care
Key Performance Area: Hospital-Prehospital
Type: Outcome

Statewide EMS System Evaluation Project

SYSTEM PERFORMANCE INDICATOR

CARDIAC ARREST (UNWITNESSED) SURVIVAL RATE
HOSPITAL DISCHARGE ALIVE

DEFINITIONS Prehospital Patient: -patients who access an organized EMS system
Cardiac arrest: -documented absence of pulse and respirations
Witnessed: -condition did not occur in presence of Bystanders or trained EMS personnel.
Survival to discharge: return of spontaneous circulation-discharged from hospital alive.
Survival rate: -the number of patients discharged from hospital divided by the number of patients with unwitnessed cardiac arrest of cardiac etiology

REPORTING: Aggregate - % survival to discharge alive rate per total cases
Formula - total survival to discharge divided by total cases x 100 = %
Data points- -inclusion: all pts coded with cardiac arrest - unwitnessed
-pts discharged from hospital after return of spontaneous circulation
Data Source- Patient Care Documents (document by EMS personnel)
Hospital admission records

ANALYSIS: Benchmark Comparison - Best Practices

STATE BENCHMARK: TBD by baseline data collection

BENCHMARK REFERENCES
1. 6.0% Survival Bunwitnessed B Utstein Model; Pitt, Penn
   Kass LE. One Year Survival after Prehospital Cardiac Arrest: The Utstein Model applied to Rural-Suburban EMS System. Ann of Emerg Med; 12:17-20, 1994
2. 6.4% Survival B unwitnessed, Wisconsin study
   Olson DW, MD. EMT-Defibrillation: The Wisconsin Experience. Ann of Emerg Med, 18:8;806. 1989
3. 6.0 % Survival Bunwitnessed B Seattle, Washington
   Weaver DW, MD. Considerations for Improving Survival from Out of Hospital Cardiac Arrest. Ann of Emerg Med 15:10;1181, 1986.
4. 2.5% Survival-unwitnessed B Ontario, Canada

CLASSIFICATION
Component: Prehospital Medical Care
Key Performance Area: Hospital-Prehospital
Type: Outcome

HOSPITAL ADMISSION

DEFINITIONS Prehospital Patient: -patients who access an organized EMS system
Critical Trauma: -patients over age 12 or 40 kg who have sustained one or more mechanisms of injury and any of the following physiological criteria:
Glascow Coma Scale less than 13
Systolic Blood Pressure less than 90 mm hg
Resp rate less than 10 or greater than 26/min

Survival: -admission to hospital alive
Survival rate: -the number of patients admitted to hospital alive divided by the number of patients identified as critical trauma

REPORTING: Aggregate - % survival to admission alive rate per total cases
Formula - total survival to admission divided by total cases x 100 = %
Data points- -inclusion: all pts coded with mech of inj & GCS < 13, BP<90 or Resp rate <10 or >13
-pts admitted to hospital
Data Source- Patient Care Documents (document by EMS personnel)
Hospital admission records

ANALYSIS: Benchmark Comparison - Best Practices

STATE BENCHMARK: TBD by baseline data collection

BENCHMARK REFERENCES

1. To Be Determined by baseline data.
1. 28.6% Survival B Critical Trauma B Calgary Trauma Registry
Plant J. Limitations of Prehospital Index in identifying Ptients in need of a Major Trauma Center
Ann of Emerg Med; 26:2, 133-137. 1995
2. 29% Survival B Critical Trauma, Alpine Motherlode San Joaquin Trauma Registry
Alpine, Motherlode, San Joaquin EMS Trauma Registry. 1987

CLASSIFICATION
Component: Prehospital Medical Care
Key Performance Area: Hospital-Prehospital
Type: Outcome

SCENE TIMES-UNCOMPLICATED RESCUE CRITICAL TRAUMA PATIENT- ADULT

DEFINITIONS

scene time: The documented lapse of time from when ALS Unit is reported on scene to the documented time when the ALS unit is reported to be enroute to patient receiving facility with a critical trauma patient. (Wheel stop - wheel start)

critical trauma: patients who have sustained any one or more mechanisms of injury and any one of the following physiological criteria:

Glascow Coma Scale less than 13
Systolic Blood Pressure less than 90 mm hg
Resp rate less than 10 or greater than 26/min

uncomplicated rescue: scene conditions are without prolonged extrication, hazards or other complications which hinder patient access and normal timely care

adult patients who have reached their 15th birthday

REPORTING

indicator item % scene times within ten (10) mins or less (aggregate - summary)

reporting formula - the total number of scene times which were ten minutes or less divided by total critical trauma cases x 100 = %

data points- inclusion criteria: all patients with mech of inj & GCS < 13, BP<90 or Resp rate <10 or >13

numerator: total number of scene times 10 mins or under

denominator: total number of critical trauma patients (uncomplicated rescue) -

minimum points: N=30

reporting period monthly or annually (minimum of 12 consecutive months)

data source- patient care documents (document by EMS personnel)
dispatch center records

REPORTING EXAMPLE

reporting period:	**Month of 7/99**
numerator =	**total number of scene times 10 mins or under (N= 32)**
denominator =	**total number of critical trauma patients (N=38)**
formula =	**numerator/denominator x 100 = % (32/38) x 100 =84 %**
summary indicator reported item =	**84% scene times 10 mins or under (critical trauma patients)**

ANALYSIS Benchmark Comparison - Best Practices

STATE BENCHMARK TBD by baseline data collection

BENCHMARK REFERENCES

1. Textbook of Prehospital Trauma Life Support,.The Golden 10 Mins
American College of Surgeons. National Assn of EMT-s

CLASSIFICATION

Component: Prehospital Medical Care
Key Performance Area: Hospital-Prehospital
Type: Process

Statewide EMS System Evaluation Project

SYSTEM PERFORMANCE INDICATOR

EMERGENCY MEDICAL DISPATCH
CASE REVIEW COMPLIANCE

DEFINITIONS Case Review Compliance: Peer or Medical Director review of case where the EMD dispatcher provided service to the caller by obtaining appropriate information, determinig need, and providing pre-arrival instructions and dispatch of emergency resources. Each case will follow the total case rating % compliance score system as determined by the Dispatch Case Review Template. The following are case review points;

1. Basic questions obtained
2. Key questions asked
3. Case entry information asked
4. Emotional content cooperation score
5. Post dispatch and pre-arrival instructions

REPORTING:
Aggregate - % total overall compliance with all case review points
Formula - number total compliance with all case review points divided by total cases x 100 = %
Aggregate- % compliance per each case review point
Formula - number of compliance with each case review point divided by total case review point
Data points- Human review - reported compliance Yes/No
Data Source- Dispatch Agency Medical Control/Peer Review Template

ANALYSIS:
Process - Variation (Special Causation)
Benchmark Comparison - Best Practices

STATE BENCHMARK: TBD by baseline data collection

BENCHMARK REFERENCES

1. To Be Determined by baseline data.

CLASSIFICATION
Component: Prehospital Medical Care
Key Performance Area: Hospital-Prehospital
Type: Outcome

Statewide

SYSTEM PERFORMANCE INDICATOR
DRAFT

TITLE: CARDIAC ARREST SURVIVAL - ROSC
(return of spontaneous circulation)

DRAFTPERFORMANCE
INDICATOR:

A ___% of all prehospital patients who suffer unwitnessed cardiac arrest will survive to return of spontaneous circulation@

COMPLIANCE: Reported aggregate ROSC rate of TBD statewide
BENCHMARK: TBD% ROSC rate
DEFINITIONS Prehospital Patient: -patients who access an organized EMS system
Cardiac arrest: -documented absence of pulse and respirations
Unwitnessed: -condition did not occur in presence of Bystanders or trained EMS personnel.
ROSC Survival: -return of a palpable pulse
Survival rate: -the number of patients survive to ROSC divided by the total number of patients with unwitnessed cardiac arrest of cardiac etiology
REPORTING: Aggregate - % survival to ROSC rate per annual total cases

BENCHMARK REFERENCES

TBD B To Be Determined by Base Line EMS data Collection

CLASSIFICATION
Component: Prehospital Medical Care
Key Performance Area: Hospital-Prehospital

Type: Outcome

Statewide EMS System Evaluation Project
SYSTEM PERFORMANCE INDICATOR
DRAFT

TITLE: CRITICAL TRAUMA SURVIVAL - ADULT

DRAFTPERFORMANCE
INDICATOR:

A TBD 27% of all prehospital patients who suffer critical will survive to hospital discharge@

COMPLIANCE: Reported aggregate survival rate of TBD (27%) statewide
BENCHMARK: TBD (27%) survival rate
DEFINITIONS Prehospital Patient: -patients who access an organized EMS system
Critical Trauma: -patients over age 12 or 40 kg who have sustained one or more mechanisms of injury and any of the following physiological criteria:

Glascow Coma Scale less than 13
Systolic Blood Pressure less than 90 mm hg
Resp rate less than 10 or greater than 26/min

Survival: -discharged from hospital alive
Survival rate: -the number of patients discharged alive from the hospital divided by the number of patients identified as critical trauma

REPORTING: Aggregate - % survival rate per annual total cases

BENCHMARK REFERENCES

1. To Be Determined by baseline data.
1. 28.6% Survival B Critical Trauma B Calgary Trauma Registry
Plant J. Limitations of Prehospital Index in identifying Ptients in need of a Major Trauma Center
Ann of Emerg Med; 26:2, 133-137. 1995
2. 29% Survival B Critical Trauma, Alpine Motherlode San Joaquin Trauma Registry
Alpine, Motherlode, San Joaquin EMS Trauma Registry. 1987

CLASSIFICATION
Component: Prehospital Medical Care
Key Performance Area: Hospital-Prehospital
Type: Outcome

Statewide EMS System Evaluation Project
SYSTEM PERFORMANCE INDICATOR
DRAFT

TITLE: NON TRANSPORT DISPOSITION
PERFORMANCE
INDICATOR:

ANo more than TBD (32%) of all prehospital patients who access the EMS system will refuse transportation to hospital@

COMPLIANCE: Reported aggregate refusal rate of less than TBD (32%) statewide
BENCHMARK: TBD (32%) refusal rate
DEFINITIONS Prehospital Patient: -patients who access an organized EMS system
Refusal: -EMS personnel/transporation are summoned to to scene. Patient contact intiated. Patient refuses transportation with agreement of on scene personnel and/or medical control. Pt deceased. Pt transported by another ambulance

Refusal rate: -the number of patients not transported to hospital divided by the number of total number of patient contacts.

REPORTING: Aggregate - % refusal rate per annual total cases

BENCHMARK REFERENCES

1. TBD by baseline data
2. 38% refusal rate - UCSF
   Braun O, MD. Characteristics of a Midsized Urban EMS System
   Ann of Emerg Med; 19:536-546. 1990

CLASSIFICATION
Component: Prehospital Medical Care
Key Performance Area: Prehospital
Type: Outcome

Statewide EMS System Evaluation Project
SYSTEM PERFORMANCE INDICATOR
DRAFT

DISPATCH INTERVAL B RESPONSE TIME (URBAN)

DRAFT
PERFORMANCE A90% of all ambulance response times to designated INDICATOR: urban areas will be within 8 mins or less statewide@

COMPLIANCE: Reported aggregate response times within 8 mins or less, 90th percentile
BENCHMARK: 8 mins or less to urban region - 90%
DEFINITIONS response time: the cumulative lapsed time between call received by dispatch center and when ambulance reports on scene.
urban region: EMS service areas designated as Aurban@ geographic zones by local EMS system managers.
ambulance: a emergency transport vehicles designated by local EMS system managers as dedicated and available to respond.
REPORTING: Aggregate - % response by ambulances to urban area within 8 mins or less

BENCHMARK REFERENCES

3. 90% response interval - 8 mins
   Pointer.J,M.D. Evaluation of EMS Systems; ideal dispatch & field interval standards
   National Assn of EMS Physicians. Mosby-Year Book., 1993, pp. 36-48.

4. 90% respone interval - 8 mins
Joint Commission on Acreditation of Healthcare Organizations. characteristics of clinical indicators. Quality Review Bulletin. 1989; 15:330-339.

3. 90% response interval B 8 mins
Ryan, J. M.D., Prehospital Systems & Medical Oversight. National Association of EMS Physicians. Mosby, 1994. p 225

CLASSIFICATION
Component: Transport Vehicle Response
Performance Area: Dispatch
Type: Process

Statewide EMS System Evaluation Project
SYSTEM PERFORMANCE INDICATOR
DRAFT

DISPATCH INTERVAL B DETERMINE TIME

DRAFT
PERFORMANCE
INDICATOR: A90% of all emergency ambulance dispatches shall have a *Determine Time* of 30 seconds or less statewide@

COMPLIANCE: Reported aggregate determine times within 30 sec or less, 90th percentile
BENCHMARK: 30 sec or less - 90% of time
DEFINITIONS determine time: the interval between the time that a call is received by dispatch center and when ambulance is dispatched.
ambulance: a emergency transport vehicles designated by the local EMS system managers as dedicated to respond.
REPORTING: Aggregate - % determine time by ambulances within 30 secs or less

BENCHMARK REFERENCES

1. 90% Determine time interval - 30 secs
Pointer.J,M.D. Evaluation of EMS Systems; Ideal dispatch & field interval standards National Assn of EMS Physicians. Mosby-Year Book., 1993, pp. 36-48.

CLASSIFICATION
Component: Transport Vehicle Response
Key Performance Area: Dispatch
Type: Process

Statewide EMS System Evaluation Project

SYSTEM PERFORMANCE INDICATOR
DRAFT

DISPATCH INTERVAL B ROLL TIME (URBAN)

DRAFT
PERFORMANCE
INDICATOR: A 90% of all emergency ambulance *Roll Times* to designated urban areas will be within 5 mins or less statewide@

COMPLIANCE: Reported aggregate Roll times within 5 minsor less, 90th percentile
BENCHMARK: 5 mins or less - 90% of time
DEFINITIONS roll time: the interval between dispatch of ambulance and when ambulance reports on-scene.
urban region: EMS service areas designated as Aurban@ geographic zones by local EMS system managers.
ambulance: a emergency transport vehicles designated by the local EMS system managers as dedicated and available.
REPORTING: Aggregate - % roll time by ambulances within 5 mins to urban areas

BENCHMARK REFERENCES

1. 90% Roll Time time interval - 5 mins
Pointer.J,M.D. Evaluation of EMS Systems; Ideal dispatch & field interval standards National Assn of EMS Physicians. Mosby-Year Book., 1993, pp. 36-48.

CLASSIFICATION
Component: Transport Vehicle Response
Key Performance Area: Dispatch
Type: Process

I. PROPOSED ORGANIZATIONAL STRUCTURE

In order to implement the statewide EMS system evaluation project a broad-based network of system managers and stakeholders must be formally established. The network must have a structure to facilitate the collection, evaluation and promote action to improve EMS system performance. In order to accomplish this task the following functional components were identified:

COMPONENT FUNCTION

_ Oversight: Provide statutory authority, supervision, direction and point of contact for statewide communication. (EMSA, EMS Commission)

_ Advisory: Provide specific medical expertise, request for studies, and medical oversight. (EMDAC, EMSAAC)

_ Management: Provide overall business, clerical and organizational management of operations (EMSA)

_ Support: Provide expert consult and training in designing, collecting, reporting and presenting relevant EMS information (EMSA. Expert Consultants)

Functional Model

Below is a organizational chart illustrating the proposed functional model for the network. Essential components to make the network function include oversight, advisory, management and support components

Flow of Information - key performance indicators

The following diagram shows the flow of information to the organizational component and the feedback system **The model illustrates information being accepted and transferred from the provider and hospital level to the state CQI organization and feedback loop returning results and reports back to these agencies with the LEMSA as the intermediary depository.**

Diagram VIB. Flow of information (------ = feedback loop, _____= Info)

Flow of Reporting and feedback on information (key performance indicators)
Key Performance Indicator information should flow freely from provider to LEMSA, Hospital to LEMSA, LEMSA to Statewide CQI Component. Information can also be shared by providers and hospitals directly and should be available (aggregate-blinded) to constituent groups on a regular basis.

Aggregation of Data
At higher levels of authority, a summary approach to process management is used (*NTSA DOC*). In collecting and measuring data for statewide purposes, it is recommended that data be aggregated and blinded during presentation or evaluation. For the purposes of improvement action, the data in some cases, may need to be stratified. Stratification should be done within a confidential and formal CQI process.

Confidentiality
The challenge of the statewide organizational model is to remain relevant in providing information on EMS system performance while maintaining the integrity and confidence of contributing participants. Clear and concise rules of reporting and publishing information will be required to protect the desire to openly participate in the process. Confidentiality and coding of information must still be addressed.

Funding
Costs associated with the organizational model is being partially funded through the grant project. However, participation is voluntary and support for activities and contributions to the project are minimal. Currently, the participants have recognized the reality that in kind contributions are necessary for continued support of this work. Both the vision group work completed in December of 1998, and the second year objectives of the grant project address this

concern. Continued support for the AVision for the Future@ objectives as issued by the state EMS Authority remains critical and necessary to continue statewide CQI activities.

I. DRAFT ACTION MODEL

This project has utilized three separate sources for developing a action-process for EMS system evaluation; 1). The Joint Commission for Accreditation of Health Organizations (JCAHO) CQI model, 2). The National Transportation Safety Administration (NTSA) Leadership Guide to Quality Improvement, and 3). The Rapid Cycle Improvement Model [444] as demonstrated at the national levels by consultants to this project from the Center for Children=s Health Outcomes based in San Diego, California.

Initiating the Quality Improvement Sequence: The Questions to Ask

Following is a description of quality improvement methodologies and a number of key questions to be addressed prior to implementing a quality improvement project.

[444] **Berwick DM, Quality Improvement as an Ideal Health Care**
New England Journal of Medicine, 320, January 5 1989

Continuous Quality Improvement (CQI) is an approach to quality management that builds on traditional Quality Assurance (QA) methods by emphasizing organizational systems and processes (rather than individuals); the need for objective data with which to analyze and improve processes and outcomes; and the idea that processes, outcomes, and performance can be improved even when high standards appear to have been met.[1] While QA focuses on eliminating negative outliers in a system, CQI looks at how the performance of a system as a whole can be enhanced by making continuous improvements in all areas of the system.

Prior to engaging in any quality improvement project, we must first determine our purpose and identify our objectives. We begin by selecting a focus area and articulating the question we want to answer. We than ask ourselves why are we looking at this area and attempting to answer this question. Why is it important? What do we want to accomplish?
Next, we flush out our method of answering the question - the emphasis here is on data collection. What data should be gathered? How will we access those data? Are the data elements accurately defined? Are the data reliable? How will we analyze the data?

Finally, we establish the appropriate time frame for change to occur. An RCI cycle can be as short as two weeks or as long as several months, depending upon the area to be improved (for example, events occurring frequently would require a shorter time frame in order to effect change).

By answering the important questions listed above, we have initiated the quality improvement sequence and helped to ensure that our change will be effective.

The following is an overview of the proposed process model which has been developed and influenced by the three sources. It has been modified to an eight (8) step process and allows for the flexibility of utilizing both Rapid Cycle Improvement and longer more traditional APlan-do-act-check@ improvement concepts. (for specific details and tools for each step B see appendix C)

Overview of eight (8) step process

Step 1	Asking the questions
Step 2	Defining the answers
Step 3	Collecting information
Step 4	Reporting information
Step 5	Evaluating the answer
Step 6	Acting to improve answer
Step 7	Checking for improvement

[1] Joint Commission on Accreditation of Healthcare Organizations. (1991). Development and application of indicators in emergency care. JCHO: Illinois.

Step 8 Publishing results

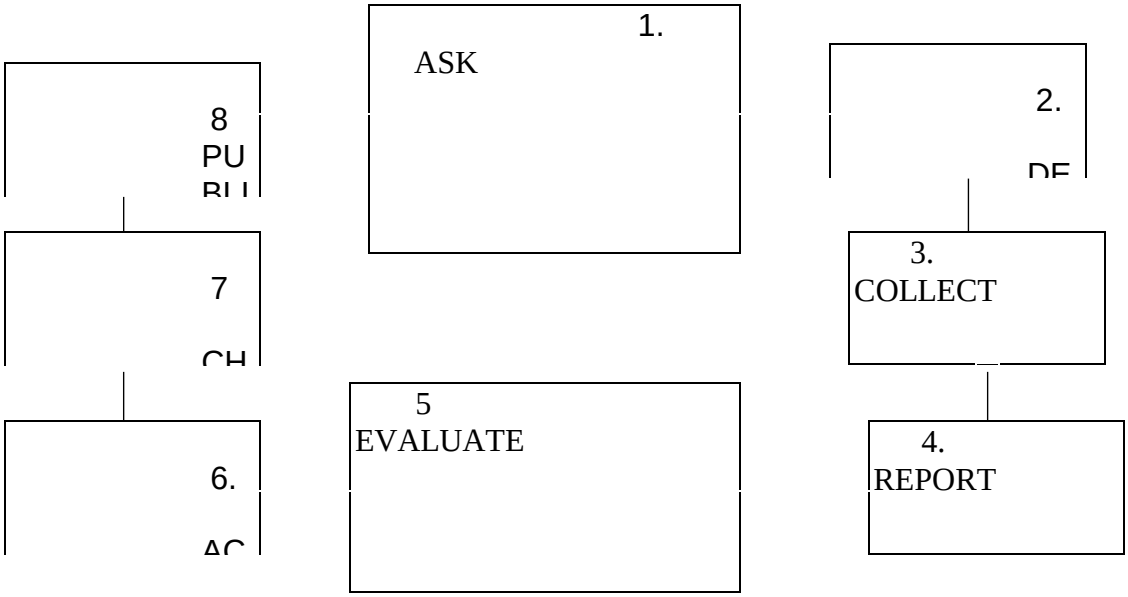


Figure IV. A Action Model

Testing the Process

Portions of the process have been trial-tested during the exercises of the advisory group in collecting and evaluating system data. Attached in appendix C is the results of a trial-test which the advisory group participated and completed in March of 1999. Specifically steps 1, 2, 3, 4 and 5 were attempted by the group. Out of the twelve (12) member advisory group, five agencies had access to organizational data and agreed to participate. The group participated in the first data submission cycle in November of 1998 and again in a second cycle during February of 1999. The following is what we learned.

Lessons Learned

General: Because the trial-test run focused demonstrating the capabilities of state agencies to identify, collect and analyze data, lessons learned showed overwhelmingly the value of choosing a subject that has meaning and can be measured by existing data collection capabilities. The following are learning points from this experience as applied to each step.

Step 1. Asking the questions
The trial-test run underscored the importance of step 1. It is truly critical to ask the pertinent questions prior to developing data collection points or protocols. Overlooking this step will result in developing information which tends to offer questions rather than answers. The questions must be clear, and answerable and above all have value to the participants. A brief training session and a clear map of where the group is proceeding is also helpful in this step.

Step 2. Defining the answer
Again, project staff found that the participants need a clear and specific meaning to the data they are collecting. In order to engage the participants, it needs to be clear how the data will be processed, applied and analyzed. The Areadiness assessment@ evolved from the challenges presented during this step. Participants must do an inventory of data collection capabilities so they can be certain that they can collect what is needed prior to attempting step 2.

Step 3. Collecting information
Time is important during this step. Project staff found that a schedule must be clear about deadlines for submission and that the schedules provide a reasonable amount of time for the participant to collect. A process for accountability (checking points) would also be helpful.

Step 4. Reporting the data
Minutes of advisory group meetings demonstrated that the data should be reported-presented to the evaluation group in a simple format which is clearly defined. Charts and graphs must be applicable to the data presented. Simple measurements of central tendancy should be easily identified and related to the subject data.

Step 5. Evaluate the answer
This step presents probably the greatest challenge. Attendance, location, format, organization, preparation and a clear purpose are key to this step. While the group conducted this step by teleconference, clarity and purpose was difficult. The process yielded the following learning points. Place an emphasis on attendance. Stakeholders are the driving forces behind the purpose. When participants miss a meeting, they fall behind the information curve and become confused. For the purpose of clarity, provide a briefing to update participants on the history and purpose of the meeting. Develop and present steps to show how the info will be evaluated and what is the expected outcome of the group. Show a direction of where the group will go next. Provide a face to face meeting environment if possible. Face to face meetings foster an environment of

consensus and allows all participants equal access to the information and discussion

Steps 6, 7 & 8
With the development of sample indicators and the implementation of the indicator survey tool, project staff will be able to prioritize and reach consensus on Awhat has value@ in both monitoring and evaluating EMS system performance. Only then can we proceed to act on information which is judged as Aneeding improvement@. Steps 6, 7 & 8 will be attempted only when the participants are comfortable with the results of the steps 1 through 5.

Indicators Developed from the Trial-Test Run
Attached in appendix D are the indicators developed from the baseline data collection and evaluation exercise which the grant advisory group completed in March of 1999. These indicators serve as an example of how baseline data collection can help to establish benchmark standards. When existing benchmarks are not available, the participants can perform a baseline data collection process in order to establish baseline performance standards. These standards can then be reviewed and consensus reached on a benchmark or Abest practice@ basis. This process will serve as a major step in evaluating EMS performance indicators.

Rapid Cycle Improvement Model.
Rapid Cycle Improvement (RCI) is one method of Continuous Quality Improvement. It is based upon Deming=s trial-and-learning approach to improvement, the Plan-Do-Study-Act model. While CQI emphasizes incremental changes over time, RCI accelerates the process by employing shorter change cycles. Rapid Cycle Improvement is a practical and real-time approach to enhancing performance in diverse organizations. It is an especially valuable tool in making improvements in large or complex systems.[2]

[2] Langley, Nolan, & Nolan, et al. (1996). The improvement guide: A practical approach to enhancing organizational performance. Jossey-Bass Publishers: San Francisco.

Method/ Data Collection

- What data should be gathered?
- How will we access the data?
- Are the data accurate and reliable?
- How will we analyze the data?
- What is the time frame for data collection?

Attached in appendix C is an overview of the Rapid Cycle Improvement Model. This model has been integrated into step 6 as one of the options for action to improve. Step 6 also allows for the option of selecting a longer more traditional model such as those consistent with JCAHO or the NTSA Leadership Guide. This ability to choose a Aaction@ model allows for flexibility to perform improvement projects over both short and longer periods of time. This option would be based upon the judgment of the participants, managers and the level of complexity for the project.

Demonstration of Improvement Models at the Local EMS Level

Further testing of these models has been implemented at the local EMS level. Attached to this report in appendix F are documented CQI exercises using both the rapid cycle improvement and traditional-longer models. Both models demonstrate the results of applying improvement principles over short and longer periods as well as, with simple versus complex improvement objectives. These examples help to show the proposed state model in action.

I. CONCLUSION

Grant Objectives

With the recent completion of the state Avision group@ work, the project will now focus on working with leadership groups to assist in the implementation of a statewide EMS system evaluation project. The following is a list of goals for the remainder of year one and the projected completion date:

1. Prioritizing the proposed performance areas and related performance indicators B April 99
2. Presenting sample indicators to advisory groups for input and consensus B April 99
3. Presenting the sample indicators to AVision Implementation Teams@ for consensus. B 5-99
4. Presenting the project objectives and accomplishments at the state EMSAAC Conference
   for feedback and consensus building. - 6-99
5. Promoting and expanding the advisory group base 4, 5, 6-99
6. Further defining and the organizational-structural component. 4, 5, 6-99
7. Preparing and reporting the accomplishments of year one to the EMS Commission. 7-99

Year two objectives are:

1. Finalizing the draft performance indicators in subject areas identified by state vision document.
2. Formalizing the state organizational component
3. Implementing a baseline data collection cycle for finalized performance indicators.
4. Implement the proposed process model for system improvement.
5. Explore and recommend funding sources for future statewide EMS system evaluation activities.

Final Observations

This project was conceived as a means to Abegin@ a long and difficult process of organizing and defining Aa way@ to systematically evaluate the quality of EMS health delivery in California. It has been difficult, but each step has been a step well beyond where we were. The concept of quality improvement is by no means a new concept, yet the dynamics of health care and more specifically AEMS@ seems to change rapidly. New directions in EMS care are increasing pressures for EMS system organizers to re-evaluate how quality is assessed, to consider how

information regarding quality should be used, and to challenge existing notions of definitions of quality.

In order for this project to become an integral part of EMS systems management, two essential shifts in the paradigm of EMS systems must continue. First, there must be a continued investment in a corporate culture geared toward producing a high quality product. It is not enough to develop new programs and techniques of measurement and control. The stakeholders must commit to a course of constant evaluation and improvement, which is perpetual and valued.

Secondly, EMS system evaluation should not be limited to one source of information. The levels of sophistication in data collection and management must not be an end to all. Participants in organized EMS systems should be encouraged to participate in improvement programs regardless of the level of data collection resources. Moreover, subjects which needs to be evaluated should be evaluated regardless of the complexity of collecting data. The health care industries reliance on automated information systems as the primary source of data may indeed present false limitations of what areas are open to evaluate. EMS should encourage the use of other sources such as human review, collection check-sheets, customer surveys, direct observation and simulation. Furthermore, questions regarding EMS system performance should not be limited by the design of automated information systems. To the contrary, information systems should be designed to answer EMS system performance questions.

Finally, it is important to emphasize that the project staff are interested in Amaking this happen@. We have gone to lengths to not just write a document, but to show how we have applied these theories at the state and local levels. We have demonstrated that state EMS organizations have actually participated and learned from the trial-test period. We still have much to do, however we would like to express our gratitude for the sincere effort and patience of our advisory group, the hard work of our consultants, and support staff.

Statewide EMS System Evaluation Project

SYSTEM PERFORMANCE INDICATOR
DRAFT

SCENE TIMES - MAJOR TRAUMA PATIENT

DRAFT
PERFORMANCE
INDICATOR: **A 90% of all emergency ambulance *scene times* in cases involving**

ajor trauma patients will be within 10 mins or less statewide@

COMPLIANCE: Reported aggregate scene times within 10 mins or less, 90th percentile
BENCHMARK: 10 mins or less - 90% of time
DEFINITIONS scene time: lapse time from when transport vehicle reports on scene to reports enroute to recieving facility (wheel stop-start)
Critical Trauma Pt: -patients over age 12 or 40 kg who have sustained one or more mechanisms of injury and any of the following physiological criteria:

Glascow Coma Scale less than 13
Systolic Blood Pressure less than 90 mm hg
Resp rate less than 10 or greater than 26/min

ambulance: a emergency transport vehicles designated by the local EMS system managers as dedicated and available.

REPORTING: Aggregate - % scene time by ambulances under 10 mins with critical trauma

BENCHMARK REFERENCES

1. **Prehospital Trauma Life Support - the Golden 10 mins**
American College of Surgeons-1995.

CLASSIFICATION
Component: Transport Vehicle Response
Key Performance Area: Dispatch
Type: Process

Statewide EMS System Evaluation Project
SYSTEM PERFORMANCE INDICATOR
DRAFT

TITLE: TREATMENT GUIDELINE-PROTOCOL COMPLIANCE
CORONARY ISCHEMIC CHEST PAIN

A98% of all prehospital patients with coronary ischemic chest patients shall receive treatment which complies with standardized treatment guidelines-protocols@

COMPLIANCE: Reported aggregate compliance rate of 98% statewide

BENCHMARK: 98% compliance rate

DEFINITIONS Compliance: Prehospital treatment to include modalities, procedures, dosages, and routes provided to the appropriate patient, time, and order, WITHIN the indicated range of adult ALS treatment guideline-protocol: as published in the most recent version of local EMS agency ALS treatment guidelines.

CORONARY ISCHEMIC CHEST PAIN

1. oxygen administartion
2. peripheral intravenous access
3. EKG monitoring
4. administration of NTG
5. administration of aspirin
6. Administration of morphine
7. Scene Time of 20 mins??

Compliance rate: total % compliance per total cases

REPORTING: Aggregate - % compliance rate per total cases (period of time)

BENCHMARK REFERENCES

1. 98% Compliance B UCLA; EMT-P deviations from protocols
   Hoffman JR: Does paramedic base hospital contact result in beneficial deviations from protocols?, West J Med 153: P 283-287, 1990
2. 97% Compliance B Univ of Michigan; EMT-P, QA Audit
   Swor, RA: A paramedic peer review quality assurance audit, Pre Hospiatl & Disaster Medicine 6:3 321-326, 1991
3. 98% Compliance B Univ of Michigan, EMT-P, computer assisted QA
   Swor, RA: A computer assisted quality assurance audit in a multi-provider EMS system, Ann of Emerg Med 19:286-290, 1990
4. 97% compliance B Drew Medical, LA. Deviations from protocol
   Wasserberger J, MD. Base station prehospital care: judgment errors and deviations from protocol. Ann of Emerg Med 16:8, 867-869, 1987.

CLASSIFICATION

Component: Prehospital Medical Care
Key Performance Area: Prehospital
Type: Process

Statewide EMS System Evaluation Project

SYSTEM PERFORMANCE INDICATOR

DRAFT

TITLE: TREATMENT GUIDELINE-PROTOCOL COMPLIANCE
ACUTE BRONCHOSPASM - ASTHMA

A98% of all prehospital patients with acute bronchospasm-asthma shall receive treatment which complies with standardized treatment guidelines-protocols@

COMPLIANCE: Reported aggregate compliance rate of 98% statewide
BENCHMARK: 98% compliance rate
DEFINITIONS Compliance: Prehospital treatment to include modalities, procedures, dosages, and routes provided to the appropriate patient, time, and order, WITHIN the indicated range of adult ALS treatment guideline-protocol: as published in the most recent version of local EMS agency ALS treatment guidelines.

ACUTE BRONCHOSPASM-ASTHMA
1. oxygen administartion
2. Administration of bronchodilator

Compliance rate: total % compliance per total cases
REPORTING: Aggregate - % compliance rate per total cases (period of time)

BENCHMARK REFERENCES

1. 98% Compliance B UCLA; EMT-P deviations from protocols
   Hoffman JR: Does paramedic base hospital contact result in beneficial deviations from protocols?, West J Med 153: P 283-287, 1990
2. 97% Compliance B Univ of Michigan; EMT-P, QA Audit
   Swor, RA: A paramedic peer review quality assurance audit, Pre Hospiatl & Disaster Medicine 6:3 321-326, 1991
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   Swor, RA: A computer assisted quality assurance audit in a multi-provider EMS system, Ann of Emerg Med 19:286-290, 1990
4. 97% compliance B Drew Medical, LA. Deviations from protocol
   Wasserberger J, MD. Base station prehospital care: judgment errors and deviations from protocol. Ann of Emerg Med 16:8, 867-869, 1987.

CLASSIFICATION
Component: Prehospital Medical Care
Key Performance Area: Prehospital
Type: Process

DRAFT

TITLE: EMERGENCY MEDICAL TREATMENT GUIDELINE-PROTOCOL COMPLIANCE

ACUTE BRONCHOSPASM - ASTHMA

A98% of all prehospital patients with acute bronchospasm-asthma shall receive treatment which complies with standardized treatment guidelines-protocols@

COMPLIANCE: Reported aggregate compliance rate of 98% statewide
BENCHMARK: 98% compliance rate
DEFINITIONS Compliance: Prehospital treatment to include modalities, procedures, dosages, and routes provided to the appropriate patient, time, and order, WITHIN the indicated range of adult ALS treatment guideline-protocol: as published in the most recent version of local EMS agency ALS treatment guidelines.

ACUTE BRONCHOSPASM-ASTHMA
1. oxygen administartion
2. Administration of bronchodilator

Compliance rate: total % compliance per total cases
REPORTING: Aggregate - % compliance rate per total cases (period of time)

BENCHMARK REFERENCES

1. 98% Compliance B UCLA; EMT-P deviations from protocols
   Hoffman JR: Does paramedic base hospital contact result in beneficial deviations from protocols?, West J Med 153: P 283-287, 1990
2. 97% Compliance B Univ of Michigan; EMT-P, QA Audit
   Swor, RA: A paramedic peer review quality assurance audit, Pre Hospiatl & Disaster Medicine 6:3 321-326, 1991
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4. 97% compliance B Drew Medical, LA. Deviations from protocol
   Wasserberger J, MD. Base station prehospital care: judgment errors and deviations from protocol. Ann of Emerg Med 16:8, 867-869, 1987.

CLASSIFICATION
Component: Prehospital Medical Care
Key Performance Area: Prehospital

Type: Process

INDICATOR DEVELOPMENT

WHAT IS A KEY PERFORMANCE INDICATOR?
REFERENCE: *NTSA DOC: Agenda for Future*

KEY PERFORMANCE REQUIREMENTS
components of an EMS system (System requirements)

KEY PERFORMANCE AREAS
Narrow focus through strategic planning (EMS Conf) Dispatch, Prehospital, Hospital

KEY PERFORMANCE INDICATORS

Common to all stakeholders
Longterm - continuous
Critical to quality
Reported to State EMSA

KEY PERFORMANCE INDICATOR EVALUATION

PROCESS; VARIATION-SPECIAL CAUSATION

OUTCOME; BENCHMARK COMPARISONS

California Statewide EMS System Evaluation Project
Index of Indicators approved by Advisory Group

QUALITY INDICATOR	CLASS	INCLUSION CRITERIA	DATA POINT NUMERATOR	DATA POINT DENOMINATOR	REPORTING FORMULA	REPORTED INDICATOR ITEM
% ADULT **ORAL ET** SUCCESS RATE	Prehosp Process	Patients age 15 years or older treated by EMS personnel	**Total number of patient cases** where oral ET intubation was **successful**	**Total number of patients** cases where oral intubation was **attempted one or more times**	Total success /total patients x 100 = **%**	**% ADULT ORAL ET SUCCESS**
% PEDIATRIC **ORAL ET** SUCCESS RATE	Prehosp Process	Patients age up to 10th birthday or younger older treated by EMS personnel	**Total number of pediatric patient cases** where oral ET intubation was **successful**	**Total number of pediatric patients** cases where oral intubation was **attempted one or more times**	Total success /total patients x 100 = **%**	**% PEDIATRIC ORAL ET SUCCESS**
% ADULT **PERIPHERAL IV** SUCCESS RATE	Prehosp Process	Patients age 15 years or older treated by EMS personnel	**Total number of patient cases** where peripheral IV was **successful**	**Total number of patient** cases where peripheral IV was **attempted** one or more times	Total success/patient cases x 100 = **%**	**% ADULT PERIPHERAL IV SUCCESS**
ASSESSMENT BASED TREATMENT - **ADULT** Coronary Ischemic Chest Pain-Oxygen	Prehosp Process	Patients age 15 years or older who are assessed by EMS personnel	**Total number of patients** cases **receiving** oxygen	**Total number of patient cases assessed** by EMS personnel as having coronary ischemic chest pain	Total received oxygen/total patients x 100 = **%**	**% COMPLIANCE ASSESS BASED TX ADULT CICP + OXYGEN**
ASSESSMENT BASED TREATMENT - **ADULT** Coronary Ischemic Chest Pain-EKG	Prehosp Process	Patients age 15 years or older who are assessed by EMS personnel	**Total number of patients** cases **receiving** EKG Monitor	**Total number of patient cases assessed** by EMS personnel as having coronary ischemic chest pain	Total received IV/total patients x 100 = **%**	**% COMPLIANCE ASSESS BASED TX ADULT CICP + EKG**
ASSESSMENT BASED TREATMENT - **ADULT** Coronary Ischemic Chest Pain-IV	Prehosp Process	Patients age 15 years or older who are assessed by EMS personnel	**Total number of patients** cases **receiving** Peripheral IV	**Total number of patient cases assessed** by EMS personnel as having coronary ischemic chest pain	Total received IV/total patients x 100 = **%**	**% COMPLIANCE ASSESS BASED TX ADULT CICP + IV**
QUALITY INDICATOR	**CLASS**	**INCLUSION CRITERIA**	**DATA POINT NUMERATOR**	**DATA POINT DENOMINATOR**	**REPORTING FORMULA**	**REPORTED INDICATOR ITEM**

ASSESSMENT BASED TREATMENT - **ADULT** Coronary Ischemic Chest Pain-aspirin	Prehosp Process	Patients age 15 years or older who are assessed by EMS personnel	**Total number of patients** cases **receiving** aspirin	**Total number of patient cases assessed** by EMS personnel as having coronary ischemic chest pain	Total received aspirin/total patients x 100 = **%**	**% COMPLIANCE ASSESS BASED TX ADULT CICP + ASPIRIN**
ASSESSMENT BASED TREATMENT - **ADULT** Coronary Ischemic Chest Pain-Nitroglycerine	Prehosp Process	Patients age 15 years or older who are assessed by EMS personnel	**Total number of patients** cases **receiving** nitroglycerine	**Total number of patient cases assessed** by EMS personnel as having coronary ischemic chest pain	Total received oxygen/total patients x 100 = **%**	**% COMPLIANCE ASSESS BASED TX ADULT CICP + NTG**
ASSESSMENT BASED TREATMENT - **ADULT** Coronary Ischemic Chest Pain-Morpine	Prehosp Process	Patients age 15 years or older who are assessed by EMS personnel	**Total number of patients** cases **receiving** morphine	**Total number of patient cases assessed** by EMS personnel as having coronary ischemic chest pain	Total received morphine/total patients x 100 = **%**	**% COMPLIANCE ASSESS BASED TX ADULT CICP + MS**
TIME ON SCENE – 10 mins Coronary Iscemic Chest Pain (CICP) -	Prehosp Process	Patients age 15 years or older who are assessed by EMS	Total number of reported with coronary ischemic chest pain with **scene times 10 mins or less**	Total number of patients cases	Total number of reported patient cases with scene times under 10 mins/ total number of patients with CICP x 100 = **%**	**% SCENE TIMES WITHIN 10 MINS OR LESS - CORONARY ISCHEMIC CHEST PAIN**
ASSESSMENT BASED TREATMENT - **ADULT** Resp Distress with wheezes - % Compliance - **OXYGEN**	Prehosp Process	Patients age 15 years or older who are assessed by EMS personnel	**Total number of patients** cases **receiving** oxygen	**Total number of patient cases assessed** by EMS personnel as having respiratory distress with bronchospasm	Total received oxygen/total patients x 100 = **%**	**% COMPLIANCE ASSESS BASED TX ADULT RESP DIST + OXYGEN**
ASSESSMENT BASED TREATMENT - **ADULT** Resp Distress with wheezes - % Compliance - **BRONCHO-DILATOR**	Prehosp Process	Patients age 15 years or older who are assessed by EMS personnel	**Total number of patient cases receiving** a broncho -dilator medication	**Total number of patient cases assessed** by EMS personnel as having respiratory distress with bronchospasm	Total received broncho dilator medication/total patients x 100 = **%**	**% COMPLIANCE ASSESS BASED TX ADULT RESP DIST + BRONCHO - DILATOR**

QUALITY INDICATOR	CLASS	INCLUSION CRITERIA	DATA POINT NUMERATOR	DATA POINT DENOMINATOR	REPORTING FORMULA	REPORTED INDICATOR ITEM
ASSESSMENT BASED TREATMENT - **PEDIATRIC** Resp Distress with wheezes - % Compliance - **OXYGEN**	Prehosp Process	Patients who have not yet reached their 15th birthday and who are assessed by EMS personnel	**Total number of patient cases receiving** oxygen	**Total number of patients cases assessed** by EMS personnel as having respiratory distress with bronchospasm	Total received oxygen/total patients x 100 = **%**	**% COMPLIANCE ASSESS BASED TX PEDIATRIC RESP DIST + OXYGEN**
ASSESSMENT BASED TREATMENT - **PEDIATRIC** Resp Distress with wheezes - % Compliance - **BRONCHO-DILATOR**	Prehosp Process	Patients who have not yet reached their 15th birthday and who are assessed by EMS personnel	**Total number of patients** case **receiving** a broncho dilator medication	**Total number of patient cases assessed** by EMS personnel as having respiratory distress with bronchospasm	Total received broncho dilator medication/ total patients x 100 = **%**	**% COMPLIANCE ASSESS BASED TX PEDIATRIC RESP DIST + BRONCHODILATOR**
CRITICAL TRAUMA ADULT - **SCENE TIMES** **10** Min or Less	Prehosp Process	Patients 15 yrs of age or older with any mech of inj with no complicated rescue	Total number of reported critical trauma patient cases with **scene times 10 mins or less**	Total number of critical trauma patients cases	Total number of reported critical trauma patient cases with scene times under 10 mins/ total number of critical trauma patients x 100 = **%**	**% SCENE TIMES WITHIN 10 MINS OR LESS - CRITICAL TRAUMA**
CARDIAC ARREST - SURVIVAL TO HOSPITAL ADMISSION -	Hospital Outcome	Patients 15 years or older with documented absence of pulse and respirations (non-traumatic)	**Total number of patient cases in cardiac arrest admitted** to hospital	**Total number of patient cases reported** in cardiac arrest	Total patients cases admitted/Total Patients cases in cardiac arrest x 100 = **%**	**% SURVIVAL TO HOSPITAL ADMISSION - ALL CARDIAC ARREST**
CARDIAC ARREST - TRANSPORT TO HOSPITAL	Outcome	Patients over age 15 with documented absence of pulse and respirations (non-traumatic)	**Total number of patients cases in cardiac arrest transported** by EMS personnel to hospital	**Total number of patient cases reported** in cardiac arrest	Total patients transported/ Total Patients in cardiac arrest x 100 = **%**	**% TRANSPORT TO HOSPITAL ALL CARDIAC ARREST**

QUALITY INDICATOR	CLASS	INCLUSION CRITERIA	DATA POINT NUMERATOR	DATA POINT DENOMINATOR	REPORTING FORMULA	REPORTED INDICATOR ITEM
PSAP Time Interval	Disp Process	all pts 15 yrs or older where defibrillation administered by prehospital personnel	cumulative seconds from phone pick up to call effect	**total pts defibrillated**	cumulative seconds/ total patients =mean/average PSAP time interval	**( ) secs Average PSAP Time Interval**
Secondary Dispatch Agency Time Interval	**Disp Process**	**all pts 15 yrs or older where defib-rillation administer-ed by prehospital personnel**	**cumulative seconds from pick up to call effect**	**total pts defibrillated**	cumulative seconds/ total patients = mean/average 2ndary dispach center Time Interval	**( ) secs Average 2ndary Disp Time Interval**
Roll Time Prehospital Response Unit	Provider Process	**all pts 15 yrs or older where defibrillation administered by prehospital personnel**	**cumulative seconds from call effect to arrival of responding unit on scene**	**total pts defibrillated**	cumulative seconds/ total patients x 60 = mean/average Roll Time in mins	**(Secs) Average Roll Time**
% Return of Spontaneous Circulation (ROSC) Prehospital Defibrillation	Hospital Outcome	Patients 15 years or older defibrillated by prehospital personnel	**Total number of patients** with documented ROSC after prehospital defibrillation	**Total number of reported** patients defibrillated	Total patients with ROSC/Total Patients defibrillated x 100 = **%**	% Return of Spontaneous Circulation
% Survival to Hospital Admission Prehospital Defibrillation	Hospital Outcome	Patients 15 years or older defibrillated by prehospital personnel	**Total number of patients admitted** to hospital after prehospital defibrillation	**Total number of reported** patients defibrillated	Total patients admitted/Total Patients defibrillated x 100 = **%**	% Cardiac Arrest Admit to ED
% Discharged from Hospital Alive Prehospital Defibrillation	Hospital Outcome	Patients 15 years or older defibrillated by prehospital personnel	**Total number of patients discharged alive from** hospital after prehospital defibrillation	**Total number of reported** patients defibrillated	Total patients discharged/ Total Patients defibrillated x 100 = **%**	**%** Cardiac Arrest Discharged from Hospital Alive
Destination of trauma criteria patients *(criteria defined by each LEMSA)*	Prehosp. Process	Patients over 15 years of age	Total number of trauma patients meeting LEMSA trauma criteria and transported to a designated trauma center	Total number of trauma patients meeting LEMSA trauma criteria	Total patients transported to Trauma Center/Total number of trauma patients x 100=%	% Trauma Trage Destination Compliance

Destination of pediatric patients *(criteria defined by each LEMSA)*	Prehosp. Process	Patients 14 years of age and under	Total number of pediatric patients meeting LEMSA pediatric criteria and transported to a designated pediatric center	Total number of pediatric patients meeting LEMSA pediatric criteria	Total patients transported to Pediatric Center/Total number of pediatric patients x 100=%	% Pediatric Triage Destination Compliance